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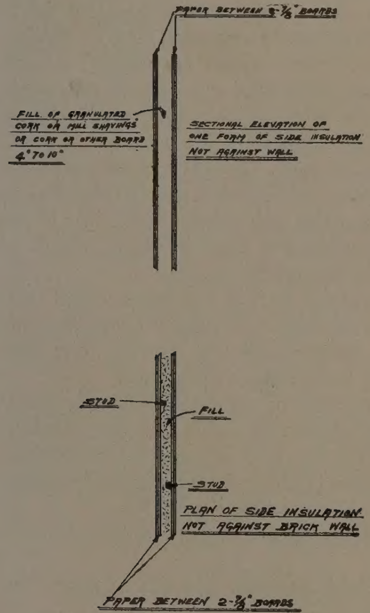
Refrigeration for Hotels and Markets

By *John E. Starr*

TAKING UP HEAT is now regarded as a matter of commensurate importance with *giving out heat* and a refrigerating plant is entitled to as careful consideration in an architect's plans as the heating plant.


PAPER BETWEEN 2-7/8" BOARDS
FILL OF GRANULATED CORK OR MILL SHAVINGS OR CORK OR OTHER BOARD 4" TO 10"
SECTIONAL ELEVATION OF ONE FORM OF SIDE INSULATION NOT AGAINST WALL
STUD
FILL
STUD
PLAN OF SIDE INSULATION NOT AGAINST BRICK WALL
PAPER BETWEEN 2-7/8" BOARDS

Side wall of a built-in refrigerator.

Especially important is this consideration in hotels and market-houses, and refrigerating methods on a small scale play a prominent part in the domestic economy of the household.

For small installations the unit method of refrigerating by a machine adapted for the amount of heat to be removed is gradually gaining ground, as is evidenced by the appearance of advertisements of appliances in the daily papers.

In hotels and markets, where the simple refrigerating operation can usually be under the eye and control of the engine-man in general charge, it is usual to use one or more machines placed suitably, usually in the general engine-room where heat taken from perhaps a multiplicity of refrigerators, large and small, is conveyed to the machine by brine circulating in flow-and-return mains, which mains are connected in multiple with coils placed in the boxes in space that would otherwise be occupied by ice, the only difference being that the coils in the box being colder on their surface than ice, and presenting a larger surface, do not take up nearly as much room. Hence a box containing a certain amount of cubic space inside of its insulating walls can devote a much larger percentage to the storage of goods.

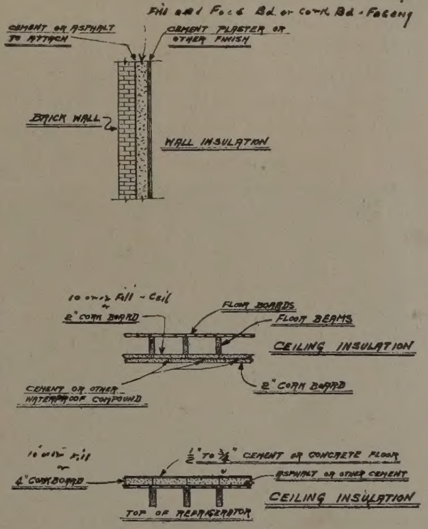
Ice might use about one-third of the cubic contents—while the coils might use less than one-sixth.

Refrigeration is produced by lowering the pressure of a liquid and hence lowering its boiling point anywhere between below zero and say 20 above zero Fahr. The action of the pump, so lowering the pressure on the suction at the same time, increases its pressure on the discharge until the pressure is sufficient to condense it to a liquid at temperatures ordinarily given by water, when it is used over again with little or no loss. The power used is the power from any source, such as a steam-engine, but of late years mostly from an electric motor. In the latter case, the power comes ultimately from the electric central station and is paid for at so many cents per K. W. hour.

Much care must be used in selecting the machine. Reliable and experienced manufacturers only should be considered. There are many makes in the market mostly all working on the same principle, that of a pump generally of the two-cylinder type.

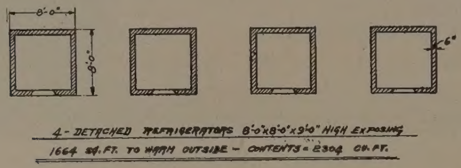
Care also must be taken in the selection of the refrigerant used, and for hotels and markets and places of large occupancy, it is often considered advisable to use a fluid that offers no objections in case of a possible leak and escape of gas. None of the liquids usually used are especially dangerous to life or destructive of property, but some are offensive and may be alarming to the public if a leak should occur.

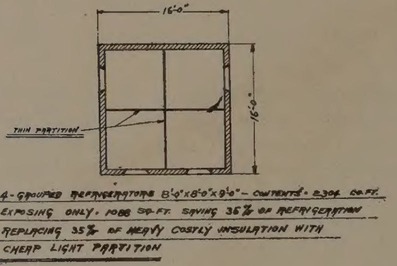
Ammonia is used by perhaps 85 per cent of all refrigerating machines in this country, as it happens to be a cheap fluid and gives great flexibility of temperatures convenient for refrigeration and is condensible at ordinary water temperatures at convenient and moderate pressures, but it has the disadvantage of possessing a pungent smell and is irritating to the mucous membrane. If it should escape it causes discomfort, though seldom actual danger, but it might be the cause of panic in a large assemblage of people not accustomed to it.



Installation against wall.

For this reason a great many hotels prefer to use carbonic acid gas (CO^2) which is odorless and seldom or never escapes by accident in large enough quantities to be harmful or even noticeable. It is also very cheap. The power cost of refrigeration depends more on work done on the fluid than on the kind of fluid, so it makes very little difference from the standpoint of refrigerating cost what fluid is used. Chloride of methyl and chloride of ethyl are if anything rather pleasing in odor and are not likely to cause discomfort if they should escape; in fact, with the safety devices prescribed by the American Society of Refrigerating Engineers or the safety code under the law of the City of New York, there is no danger from the use of any liquid permitted and very little occasion for discomfort should a leak occur.


8'-0"
8'-0"
6"
4 - DETACHED REFRIGERATORS 8'-0"x8'-0"x9'-0" HIGH EXPOSING
1664 SQ. FT. TO WARM OUTSIDE - CONTENTS = 2304 CU. FT.


16'-0"
16'-0"
THIN PARTITION
4 - GROUPED REFRIGERATORS 8'-0"x8'-0"x9'-0" - CONTENTS = 2304 CU. FT.
EXPOSING ONLY 1088 SQ. FT. SAVING 35% OF REFRIGERATION
REPLACING 35% OF HEAVY COSTLY INSULATION WITH
CHEAP LIGHT PARTITION

Grouping of four boxes, saving 35 per cent refrigeration requirement for same cubic space.

Of course, the use of brine as a heat carrier can be avoided by sending the liquid used in the machine direct to the coils in the refrigerators and boiling there into a gas, returning the gas to the pump, but the use of brine as a heat carrier is perhaps a little better, as most anyone knows how to handle a brine valve, while it takes some experience to handle liquid used for refrigeration; so with brine the handling of the refrigerating fluid valve is all confined to one or two valves under the care of the engineer, and such opening and shutting of the valves as may occasionally be necessary at the several refrigerators can be attended to by any one having sense enough to open or shut a water-valve. To be sure, the mains and all connecting piping outside of the refrigerators must be covered just the same as that portion of steam-piping where it is not intended to give out heat should be covered. A good pipe covering costs more than the pipe, but a careful layout of mains will reduce the expense to a minimum. About 15 per cent of all the heat taken up comes through the insulation of the pipe mains; hence the necessity of laying out the piping plan so that the largest number of refrigerators can be reached by the shortest length of supply and return main.

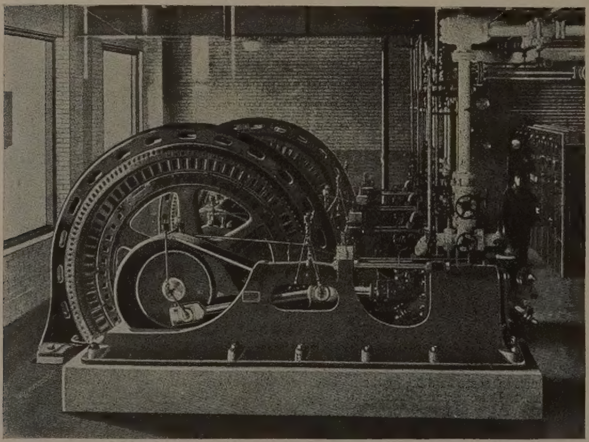
Particular attention should be paid to the possible grouping of the boxes. The amount of refrigeration required is greatly more in proportion to the square surface interposed between the warm outside and the cold inside, than to the cubic feet. Nearly 85 per cent of all the refrigeration required or heat taken up comes through the refrigerator, while only about 15 per cent may be ascribed to cooling the contents and to door openings; hence, wherever possible, boxes should be so grouped as to expose as small a surface as possible to the warm outside by placing boxes adjacent to each other or (if there be two or more floors) to place boxes on one floor over boxes on the other floors. This is generally possible in hotel work, but not often quite so easily accomplished in market installations, and yet boxes can at least be placed in much market work two and two adjoining to serve two stalls, while in hotel work it is often possible to put four or more boxes together, so as to cut out 25 per cent of the outside exposure, and sometimes better can be done. It is not always possible so to group the boxes as to give the best possible results as to total refrigeration of the entire cubical contents, but if the first principles of refrigeration are kept in mind, much of advantage can be done in this direction.

Separate boxes are usually sold in the market and provided by refrigerator builders who can supply boxes built to specification as to heat transmission per square foot, per unit of time per degree of temperature difference.

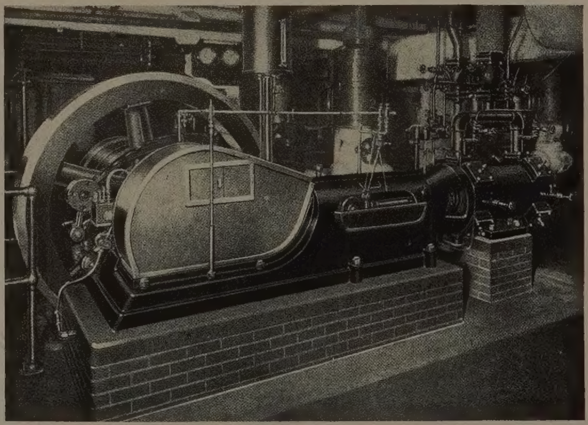
For small boxes on account of the desirability of a small percentage of space of insulation to cubic contents usually required, a transfer of about 2½ to 3 B.T.U. per square foot per day of 24 hours per degree (Fahr.) of difference in temperature inside and outside is tolerated in a good job.

In the usual run of manufactured refrigerators, the rate is greater than this.

In larger "built in" refrigerators the use of space for



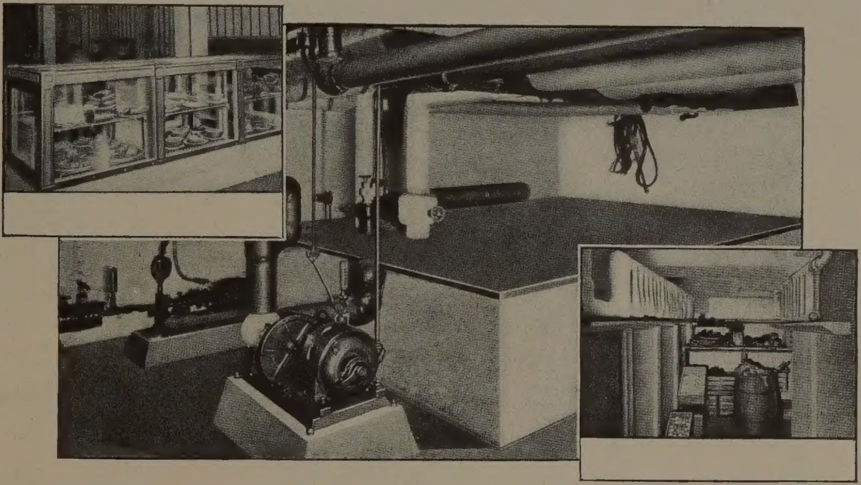
A refrigerating machine driven by electric motor.



A hotel or market refrigerating machine.

insulation is of so much smaller percentage of contents that a much better insulation is feasible, and with better heat insulation, the cost of apparatus and the cost of operation can be reduced. Not over 2 B.T.U. per square foot per day per degree of difference need be allowed, as it is commercially possible to put in up to 4 inches of insulating fill and any good insulating material should give less than 7 B.T.U. transmission per inch of thickness (or seven fourths) 1.75 B.T.U. per sq. ft. for 4 inches.

Many prefer cork board insulation which runs about 6 B.T.U. per inch of thickness and is not hygroscopic and so does not absorb much water from the air, which makes for long life and continued efficiency; but in a fairly dry exposure other material such as mill shavings, hair felt, "Lith," "Celotex" or other fibrous filling is often used and does about as well.



A machine in the engine-room of a market and some refrigerators operated by it.

Of late years it has come to be the custom to use an insulation in board shape instead of a loose fill between wooden boards. Such board insulation can be used without enclosing wooden boards at least on one side, as most of them will take a plaster or other finish and stand up well.

The insulating boards may be stuck to the wall by cement mortar or by hot asphalt, and the exposed interior covered with a coat of plaster finished smoothly, and perhaps an enamelled finish or any of the various finishing compounds on the market can be used.

Owing to the fact that the larger part of all the refrigeration required is due to heat coming through the insulation, it is always wise to see to it that the insulation be good down to the point where the interest and upkeep and amortization account on insulation balances refrigerating cost. There is no use of going any further.

A little figuring on this item is liable to show the possible saving of a lot of money both in first cost of apparatus and in cost of operation.

And beyond this lies the feeling of satisfaction of a client in seeing his operation not only economically but comfortably carried on.

The interior arrangement of the refrigerator must be carefully looked after. The piping must be so disposed as to give the best air circulation possible around the goods.

The ultimate object of refrigeration is of course the preservation of goods stored in the refrigerator.

Air carries the heat that is originally in the goods (a small item) and heat that would reach the goods to the cold piping and through the piping to the brine or other cooling agent, thence to the cooler of the machine and thence to the gutter or drain, where it will do no harm.

So it is well to see that the air reaches and surrounds the goods in its circulating course, and so picks up the best. Air approaching the piping will always be warmer generally by 15 or 18 degrees than air around the coldest part of refrigerator.

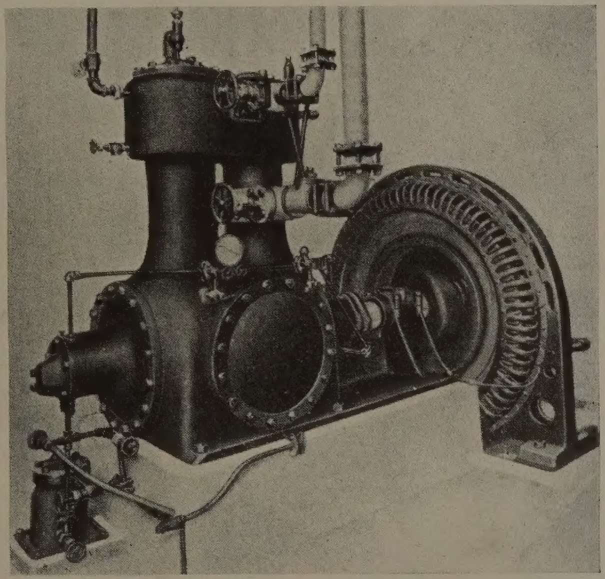
In an ice box, for instance, it is not unusual to see air leaving the ice at pretty near 32 and reaching pretty near 60 when the bulk of the space is from 45 to 55. So it should be with the piped refrigerator only that the temperatures may all be lower.

In some installations mere convection of the air is not relied on, but the air is moved forcibly by fans.

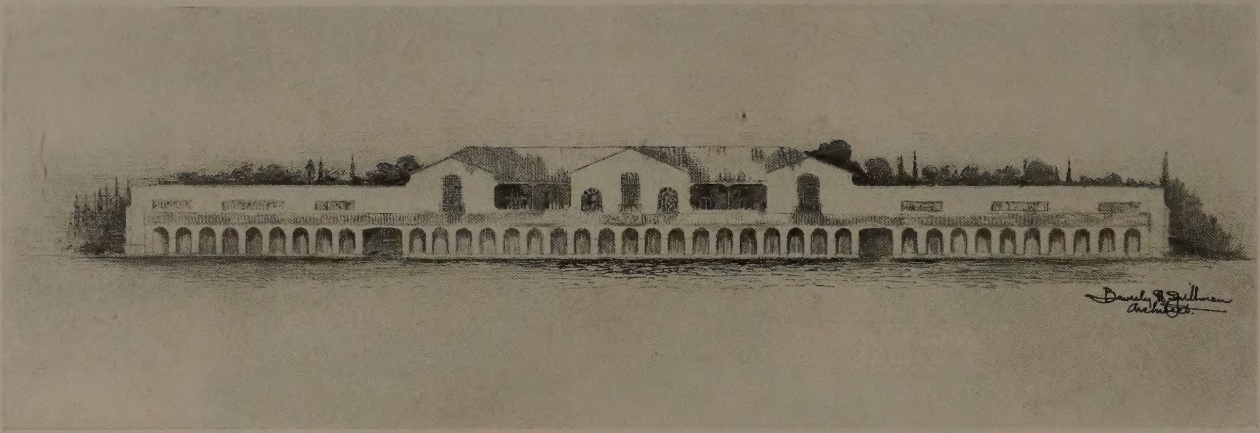
In the latter case a large amount of air is kept in circulation and the range of temperature between the air leaving the piping and approaching the piping may be much less.

This is only used where the entire contents of the box are desired to be kept at nearly the same temperature, such as in the case of eggs for long storage. It is not necessary in short-storage boxes, where a difference of 4 or 5 degrees in the main portion of the refrigerator cuts no figure, so long as the warmest temperature is low enough to hold the goods for their expected period.

Most goods in hotel and market work are comparatively rapidly turned over and the storage period amounts to only a few days, while in cold storage work goods are held often for months in store and a different and more even temperature scale must be used.



A market or hotel refrigerating machine, motor drive.

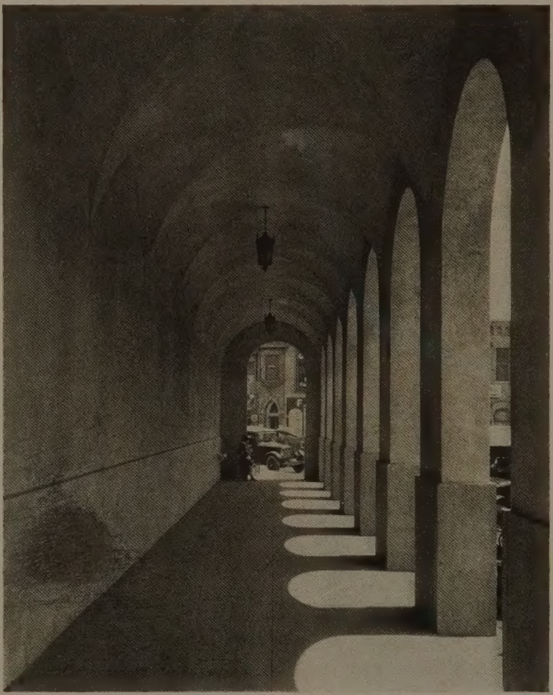


Design for entire structure.

The New Municipal Market-House of San Antonio, Texas

Beverly W. Spillman, Architect

DESIGNED in the Spanish type of architecture, which, with Italian, is being encouraged by local architects, the new market-house addition is presented. It is built on the side of the two parks on the east and west of the old market-house building.



Street arcade.

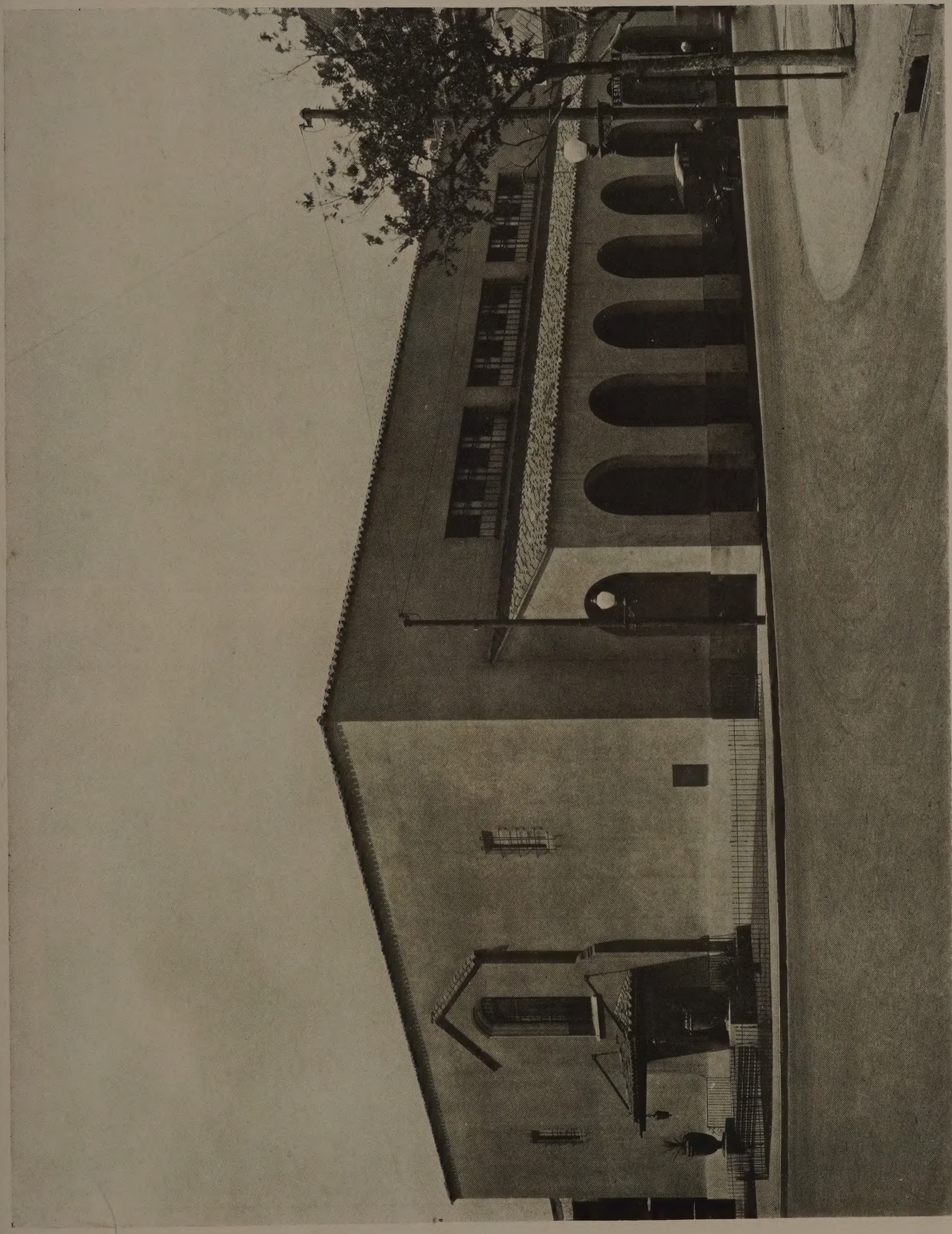
The building is of an ivory color with Latin clay tile roof, with all coping of walls capped with the same tile. The arcades are placed over sidewalks on the north and south elevations and run the entire length of 534 feet. The market is equipped with a modern refrigerating plant and each stall has a separate cold-storage space. All of the stalls are uniform in height, with lighting and fan systems carried out in the same manner.

On the main floor of the annex there are stalls of meat markets with cases refrigerated, vegetable stalls, groceries, and delicatessen space. On the mezzanine floor of this annex are ladies' rest rooms, ladies' toilets, men's toilets and locker space. There is dry-storage space for each stall and a space for music. An office is provided for the master, where he can overlook the entire annex without leaving his desk.

There is a refrigerating plant for the entire market, including coal-storage space for the annex and old building. There is space for cleaning and preparing vegetables, with the latest plumbing fixtures for this purpose. The incinerator is located near this cleaning-room, where all trash and débris around the market can be consumed. There are meat-market stalls, vegetable stalls, milk-products stalls, dressed-poultry and fish departments. The poultry and fish cleaning are separated by glass partitions from the sale space, thereby keeping these departments without odor. There is a mezzanine floor built in at each end of the building, affording dry-storage space, with office for market-master, and bandstand. The entire interior of the market is in a thoroughly sanitary and modern condition. The market has stalls of uniform height, with the latest lighting and ventilation systems, and is, wherever possible, finished in white tile.

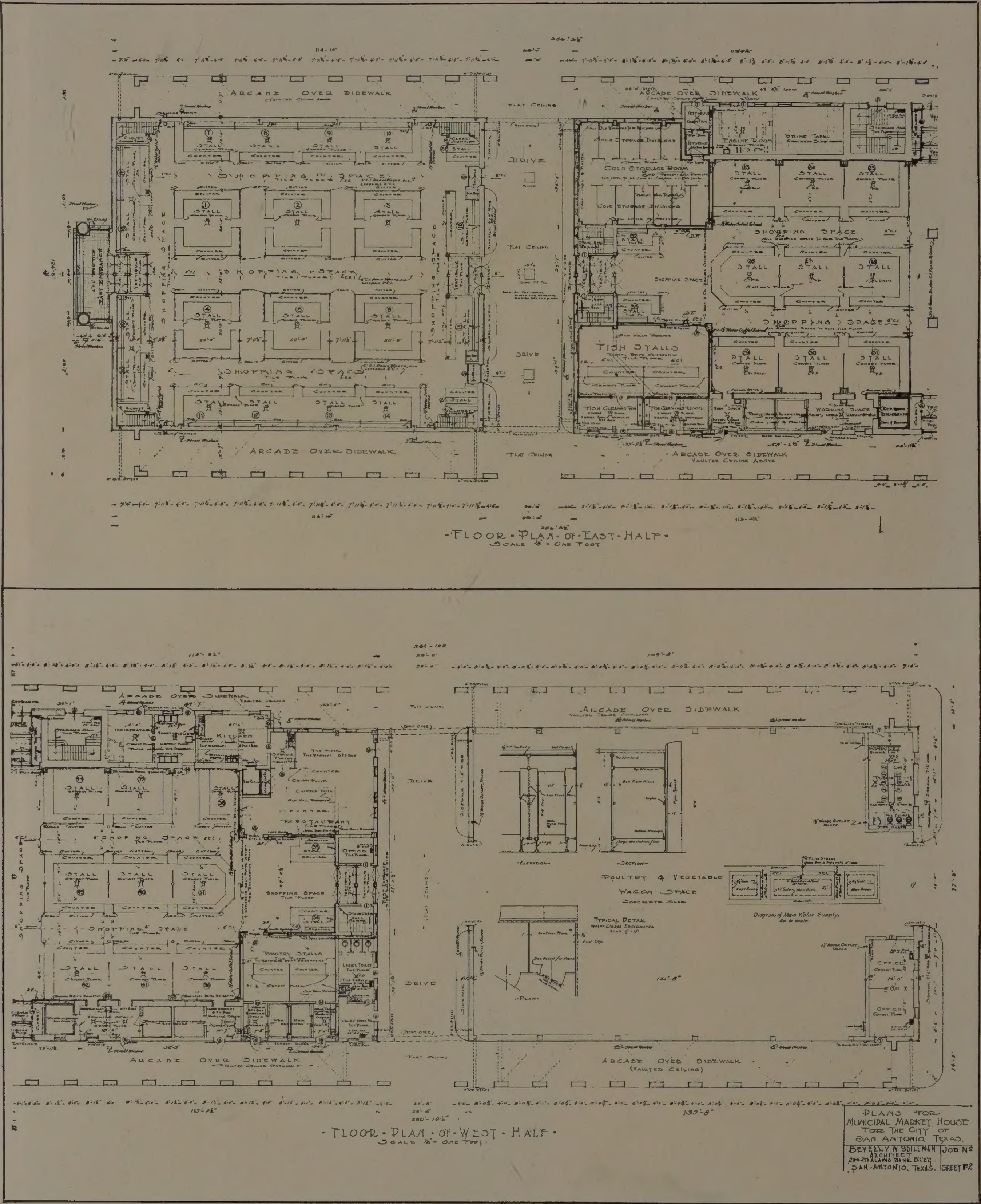
In the live-poultry department on the west there is space for public rest rooms, with offices for market-master over this department. The building will be 135 feet by 94 feet, covered and so arranged that it can be closed up in bad weather. There are two sallyports 28 feet in width, where customers can drive their cars in and enter market without being exposed to bad weather when shopping.

The auditorium floor is equipped for National Guardsmen room, with space for drilling, gun-room, locker-room, two officers' rooms, and toilets with showers. There is an assembly-room with anterooms leading off the main auditorium floor, with beautiful balconies, which may be entered from the main auditorium and from the stair hall. The new Municipal Market is modern in every respect, with the latest market ideas incorporated. The total dimensions of the building are 94 by 534 feet. Mr. Spillman hopes that San Antonio's municipal market will be a model for other growing cities.



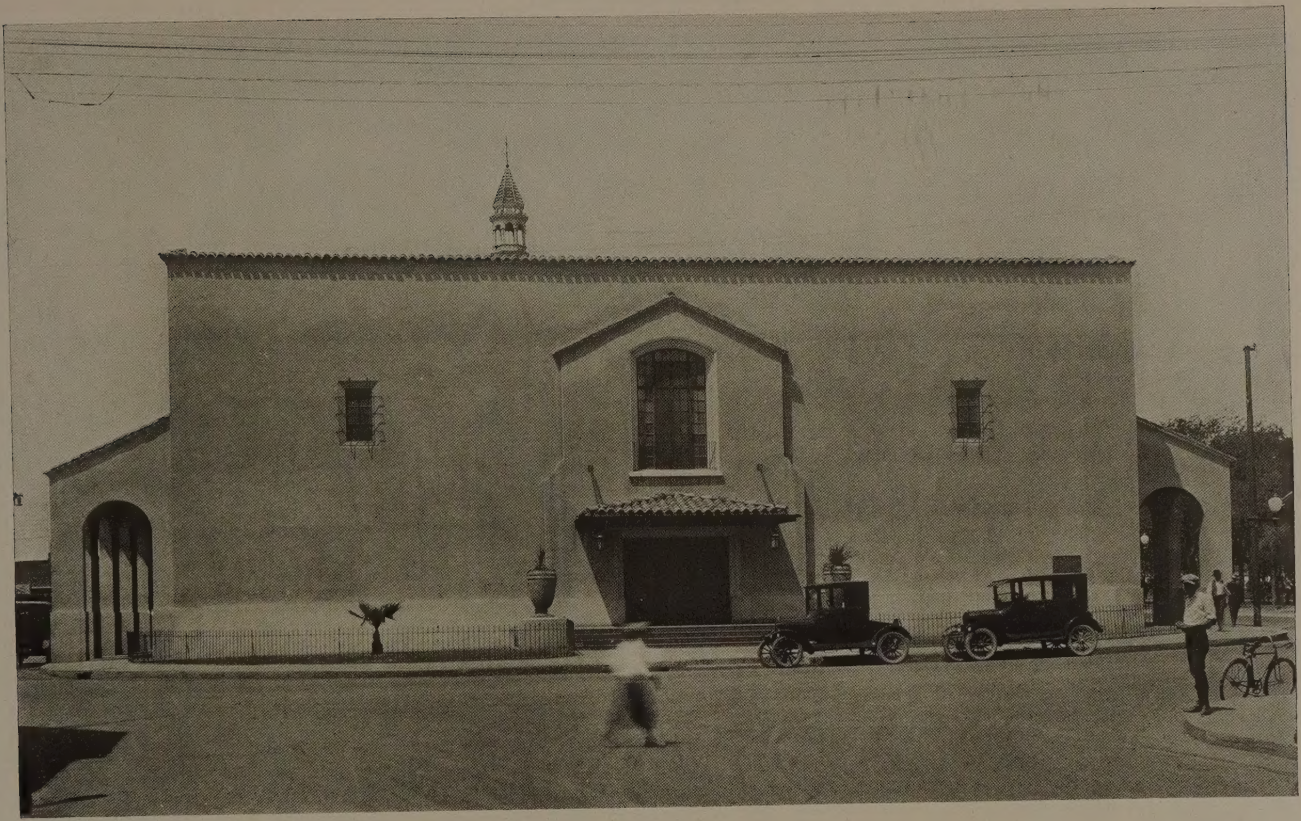
COMPLETED SECTION, NEW MUNICIPAL MARKET-HOUSE, SAN ANTONIO, TEXAS.

Beverly W. Spillman, Architect.

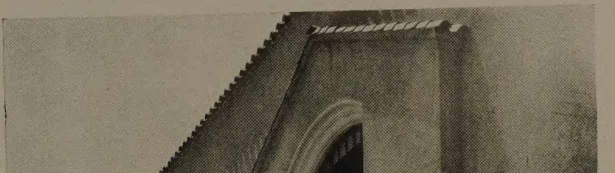


PLANS, NEW MUNICIPAL MARKET-HOUSE, SAN ANTONIO, TEXAS.

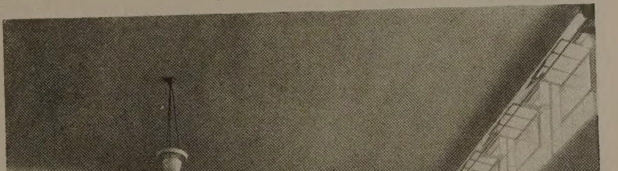
Beverly W. Spillman, Architect.



FAÇADE.

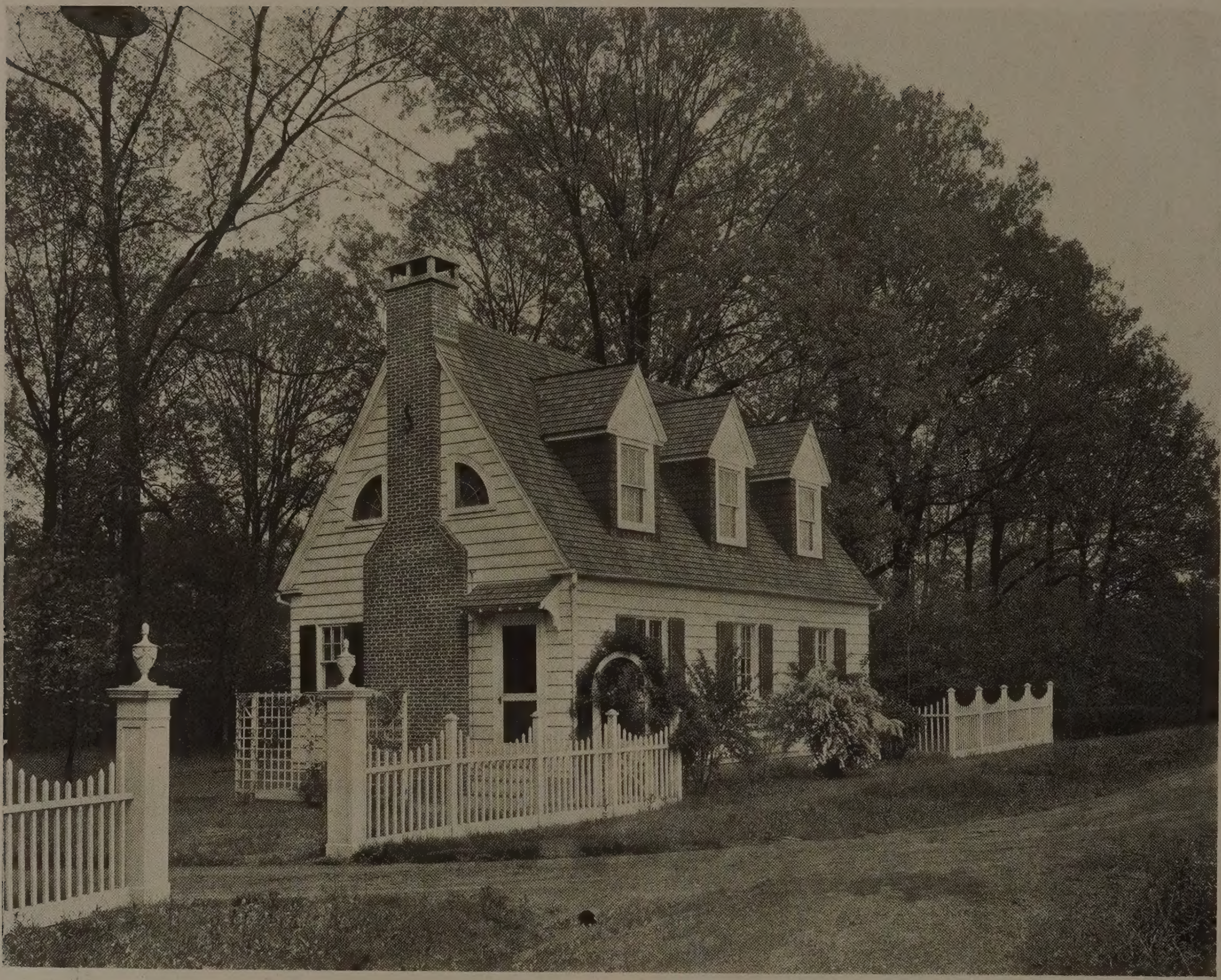


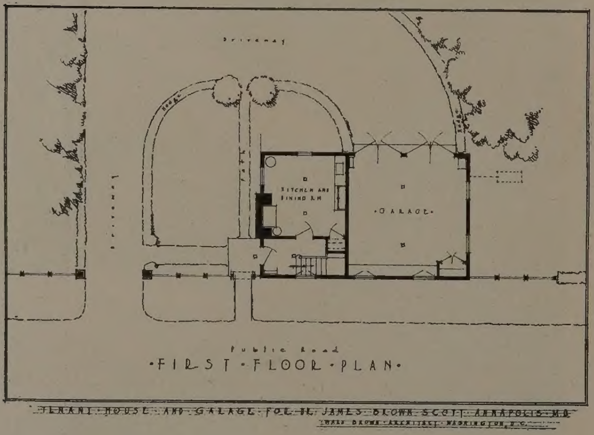
ENTRANCE DETAIL.

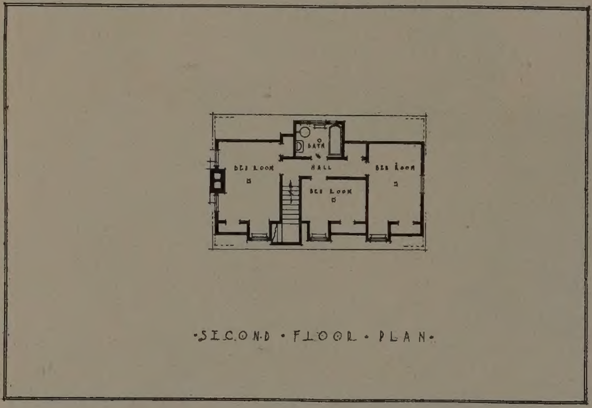


THE STALLS AND CORRIDORS.

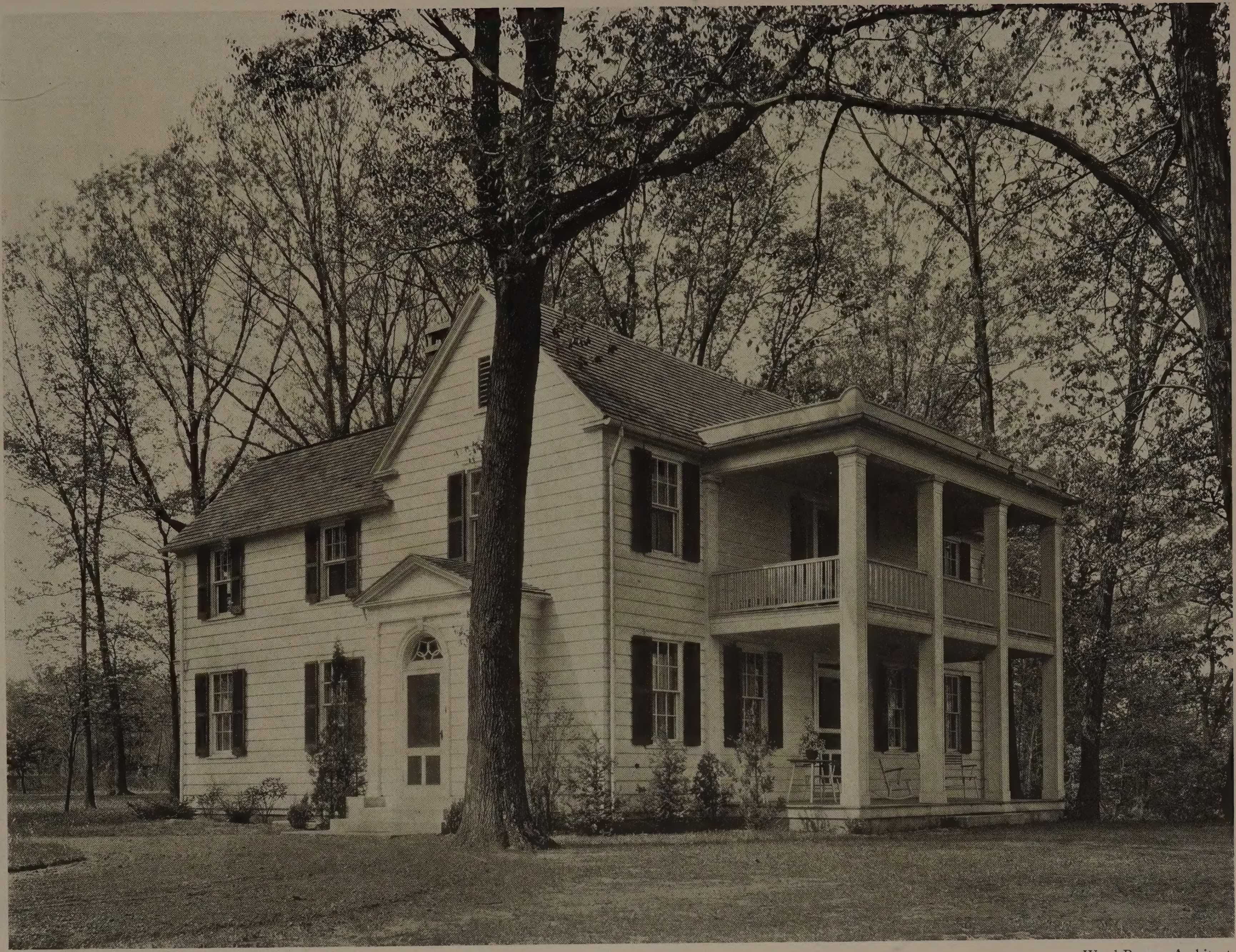
NEW MUNICIPAL MARKET-HOUSE, SAN ANTONIO, TEXAS.
Beverly W. Spillman, Architect.




Driveway
Hedge
Path
Driveway
Hedge
KITCHEN AND DINING RM
GARAGE
Public Road
FIRST FLOOR PLAN
TENANT HOUSE AND GARAGE FOR DR. JAMES BROWN SCOTT ANNAPOLIS MD
WARD BROWN ARCHITECT WASHINGTON, D.C.

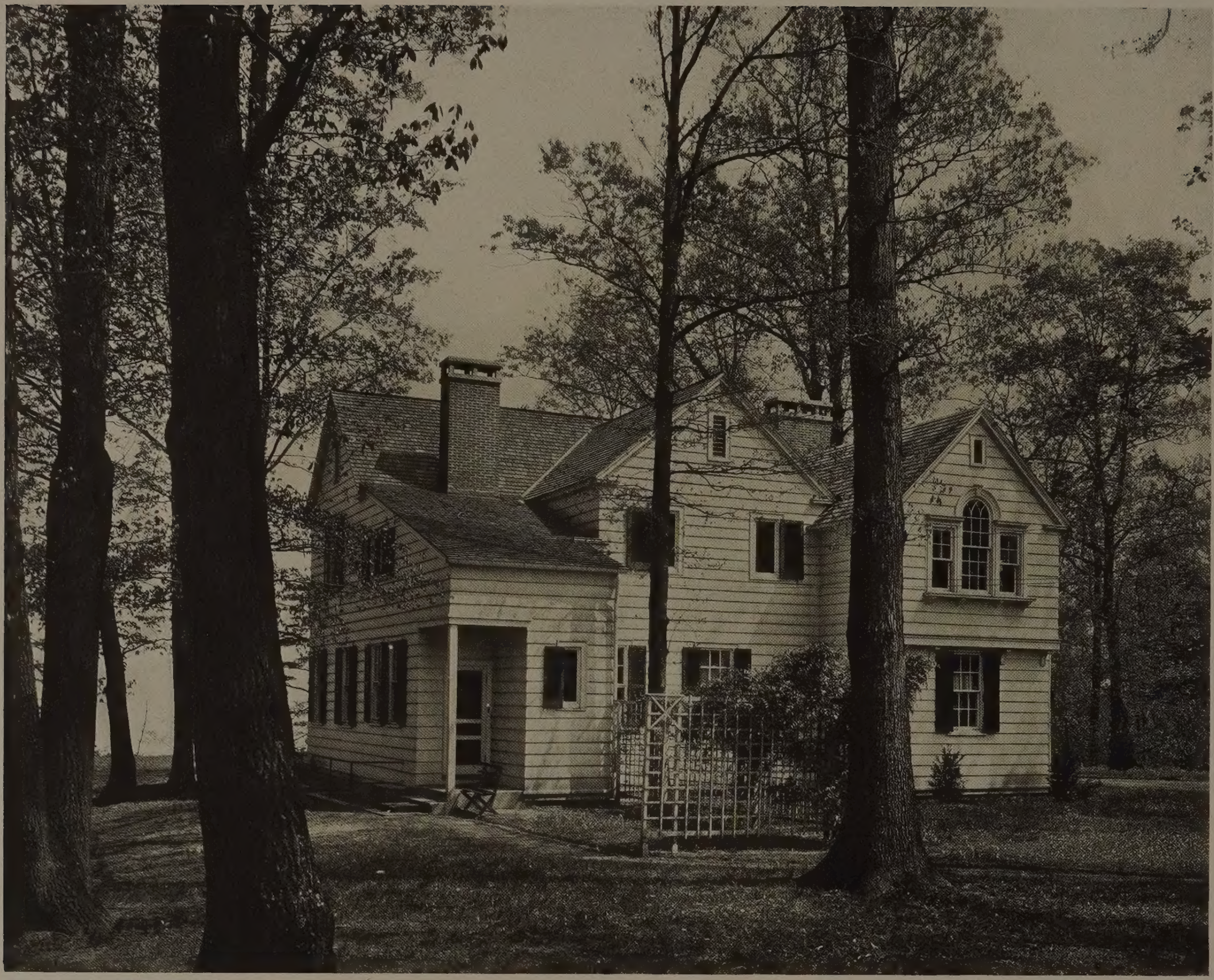


ENTRANCE GATES, LODGE, AND GARAGE, DOCTOR JAMES BROWN SCOTT, ANNAPOLIS, MD. Ward Brown, Architect.

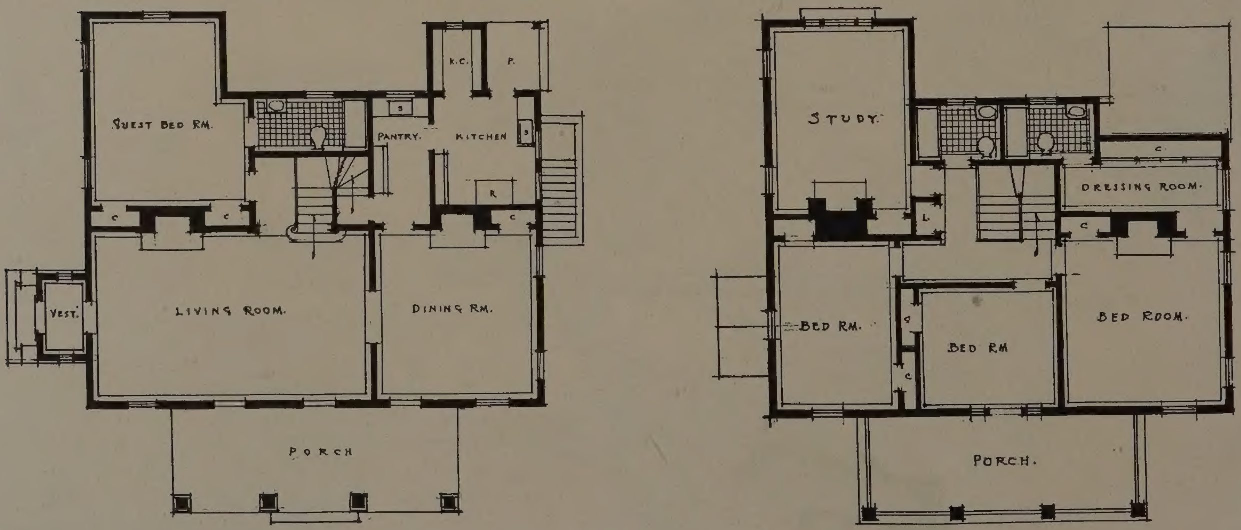


RESIDENCE, DOCTOR JAMES BROWN SCOTT, ANNAPOLIS, MD.

Ward Brown, Architect.



REAR OF RESIDENCE.



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Editorial and Other Comment

Honoring the Crafts

"WHILE the last brick was being laid and the last stone set on the Barclay-Vesey Building, New York City, September 10, 1925, all trades on the job stood by at the dedication of the largest telephone building in the world. Following the dedication, certificates of award were presented to Matthew D. Mahoney, bricklayer, and George S. T. Bain, stone-cutter, in recognition of superior craftsmanship shown by them on the job by Stephen F. Voorhees, president of the New York Building Congress as well as a member of the architectural firm of McKenzie, Voorhees & Gmelin, who designed the building."

After all is said and done, it is the good work of every individual associated with a great building enterprise that makes the final result good or bad. From the designer to the humblest laborer the obligation of honest service is to be reckoned with. In this case the two crafts especially identified with a remarkable structure were chosen for special recognition. We can imagine the pride and satisfaction in the minds of both these men, who were made a part of the ceremonies of dedication, and we can understand how their fellow workmen rejoiced with them in this signal recognition of unusual skill and thoroughness. It would be well if such things might more often be made the occasion for public acknowledgment. We read and talk a lot, at times, of the wonderful unity of spirit and pride in work shown by the old mediæval craftsmen, but human nature hasn't changed so much with the coming in of modern efficiency methods and skyscrapers, and as for pride in work, few workmen of old had the privilege of being identified with such a really marvellous achievement as is represented by almost any of our great business buildings.

Mr. William O. Ludlow, of Ludlow & Peabody, chairman of the Committee on Recognition of Craftsmanship of the Building Congress, explained the Congress idea to recognize superior craftsmanship in the different trades in the industry. He said that it was a privilege to help in the production of this building and that it was an honor to recognize superior craftsmanship in its construction. He explained that the certificates were not awarded to the men who laid the greatest number of brick, but to men who put spirit and energy as well as muscle into their work.

Quality, not quantity, is emphasized. Those two essentials of every real achievement the world has known, "spirit and energy," were never more in evidence than in these tremendously inspiring times. The "spirit" prompts men to new enterprises of daring involving the expenditure of incredible sums of money, and the "energy" that makes for organization and conservation is ready to carry them on successfully.

Too Much Organization

THAT we are overorganized in a multiplicity of ways, too ready to join any old boosters' club, too prone to hurrah for the glib-tongued speaker who tells us that what we need to do "is to organize," comes home to most of us with constantly increasing insistency. We are naturally a gregarious people, one hundred per centers or less, and most of us are ready to gather over a dinner or a luncheon and pledge some more precious time and small change to the new movement. Unhappily, it is not only in the minor ways of business life that we are overorganized. Nationally we are the victims of a Congress that seems to think that the public at large needs to be regulated along kindergarten lines. The individual's right of initiative, right of personal ways of living, right to pick and choose what he shall eat and drink, right to the property he may accumulate by industry and self-denial, are regulated by a mass of laws that are obfuscating even the minds of the legislators who devise them.

Make a noise, beat the tom-tom, cheer and hum jazz tunes, keep smiling, and the world pauses to observe just long enough to get the rhythm and join the parade. The thing about the multiplying organizations that easily becomes a serious burden is the constant demand for another little contribution. In the course of time these small amounts pile up, and even more than the money cost is the cost in time, if you keep up your interest.

Few industries are more cluttered with organizations than building. In a recent address by Colonel William A. Starrett he hit the nail on the head good and plenty when he said:

"In the building industry it is a peculiar fact that we are cursed with a great many things, especially with a multiplicity of organizations.

"There is an interesting fact about these organizations. They are gotten up with the best of intentions, and the intentions are never to be questioned as being good—they are always good—but people in the burst of enthusiasm, small or large groups, decide to organize something, some particular difficulty in our much beset industry is looming up in front of us and somebody has a remedy, so an organization is gotten up to do something with it. It is interesting how we can get our friends. Everybody has a circle of friends who will come in and quickly pitch in a hundred dollars or some amount and start the organization. That has been the history in the past. These organizations that have lived and died have shown a peculiar curve of membership right up to the top, and then they have faded away again. I speak of this more from observation than from any statistical knowledge, but I know it is so. I think if we could—and I think yet we will—compile a list of those dead organizations that have existed in the building industry you will be perfectly astounded, and some of you will see familiar names when that list is compiled, as I think it should be compiled."

The duplication of effort involves a vast amount of waste in many ways.

The Chicago Tribune Building

WE had the distinction of publishing the winning design for the Chicago Tribune Building, together with a number of the competitive designs, and we thought at that time that the award had been well placed. The finished building confirms us in this attitude.

It is a fine achievement, imposing in mass and well-considered detail. The architects are to be congratulated, and we doff our hat again to the great city by the lake. She is happily placed so she can go on spreading all over the country. Her increasing number of skyscrapers need never create the conditions that prevail in our narrow down-town streets.

The Tribune Building is not only impressive architecturally, it is the symbol and expression of power of a great newspaper, whose influence is incalculable. Its tentacles reach out all over the world, and its influence for good or evil on the public mind is beyond expression in any mere words.

Modern newspapers, as represented by the Chicago *Tribune*, our own *Herald Tribune*, the New York *Times*, with their own splendid buildings and complete modern equipment, to name only a few of these great organizations, are keeping pace with the speed of the tremendous human audiences they reach and influence.

Peter B. Wight

PETER BONNETT WIGHT, student of art and life, builder, and designer, early a fellow and for many years a secretary of the American Institute of Architects, passed away at his home in Pasadena on Tuesday, September 8, 1925, at the advanced age of eighty-seven years.

With his civic and social mindedness, Mr. Wight became, and continued to be, a factor in the architectural life of Chicago, in which city he passed the greater part of his professional career.

Mr. Wight's contributions to the professional literature were many, varied, and instructive. His history of the Chicago Chapter of the A. I. A. teems with interest and will long keep his memory green in the hearts of its members, his friends, to whom, as to all, he gave himself without stint.

Whereas: In the passing of Peter B. Wight the chapter and the profession have lost a vital force for good, a companionable and friendly spirit; therefore be it

Resolved: That the Chicago Chapter A. I. A. record its deep sense of loss and that these words of respect be spread upon the records of the chapter and be transmitted to the intimate family through the beloved sister who ministered to the talented brother in his declining years.

(Signed) IRVING K. POND,
ARTHUR WOLTERSDORF,
for the Chapter.

For the Australian War Memorial

WE are advised by the commissioner for Australia, Sir James Elder, that an architectural competition will be held for the design of the Australian War Memorial, which it is proposed shall be erected at Canberra, the capital of the Commonwealth of Australia.

This competition is open to architects resident in Australia, or architects abroad who are of Australian birth. The competition is limited to architects resident or born in Australia. There are, no doubt, a number of architects of Australian birth practising in America, and in addition there are Australian architectural students in this country.

Printed conditions regulating the submission of designs may be obtained upon application at the office of the official secretary to the Commonwealth of Australia in the United States of America, 44 Whitehall Street, New York, U. S. A., to whom designs must be delivered as prescribed, not later than 12 noon on Wednesday, March 31, 1926.

A New Competition for the Octagon House Inscription

EARLY in the year prizes were offered in a competition which closed April 1, 1925. It was expected that awards would be made at the exhibition in connection with the Fifty-eighth Convention in April. The jury, of which Mr. Howard Van Doren Shaw acted as chairman, reported that none of the designs submitted were suitable for the purpose, and the jury decided to make no awards. This result was a disappointment to the undersigned, as it must have been to those who sent in drawings. Most of the designs submitted were too monumental and out of scale with the building, while others were not in keeping with the dignity of the building.

A new competition is hereby announced, and those who have made studies are urged to revise them or make new ones for submission. All others interested also are invited to participate.

The building committee desires through a competition to secure a design for a tablet, sign, or historical device which will be dignified and refined, and at the same time sufficiently conspicuous to attract the attention of the passer-by. The purpose is to inform the public as to the historic and architectural importance of the building.

The following inscription is suggested:

THE OCTAGON HOUSE
ERECTED IN 1800
OCCUPIED BY PRESIDENT MADISON WHEN
THE WHITE HOUSE BURNED IN 1814.
THE TREATY OF GHENT WAS RATIFIED HERE.

HEADQUARTERS OF
THE AMERICAN INSTITUTE OF ARCHITECTS

The inscription may be varied at the pleasure of the competitors.

It is suggested that the memorial device take the form of a wall tablet to be fastened to the building, or an inscription in individual bronze letters let into a stone or granite sidewalk leading to the front entrance, or a sign on a pole or standard. Each competitor is at liberty to follow any idea of his own or to suggest an alternative.

Competition is open to all architects and draughtsmen.

Drawings should not exceed 24 by 36 inches.

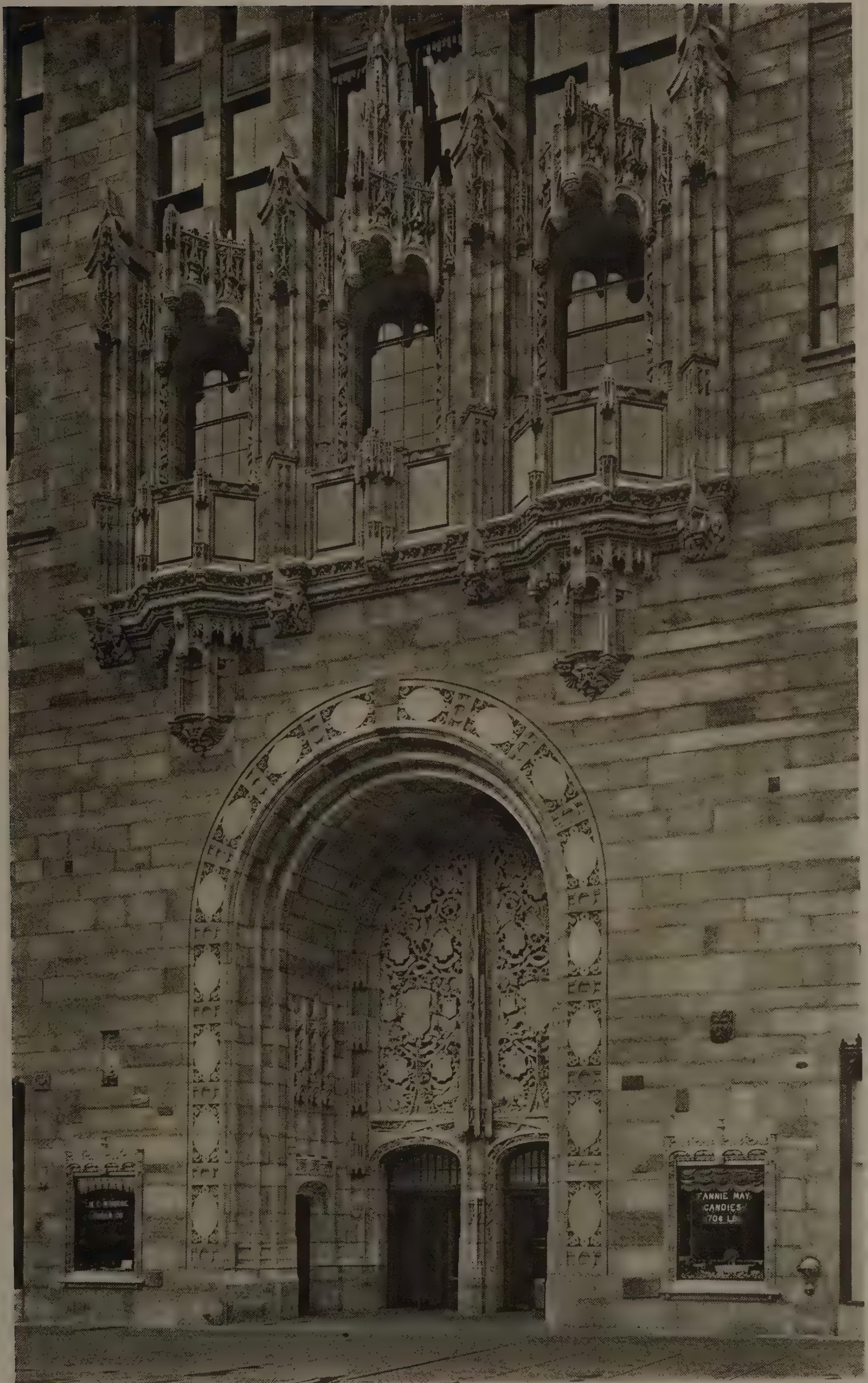
Rendering and scale at option of competitor.

Drawings shall be delivered anonymously to D. Everett Waid, 1 Madison Avenue, New York City, N. Y., on or before January 1, 1926, with the name and address of the competitor enclosed in a plain sealed envelope.

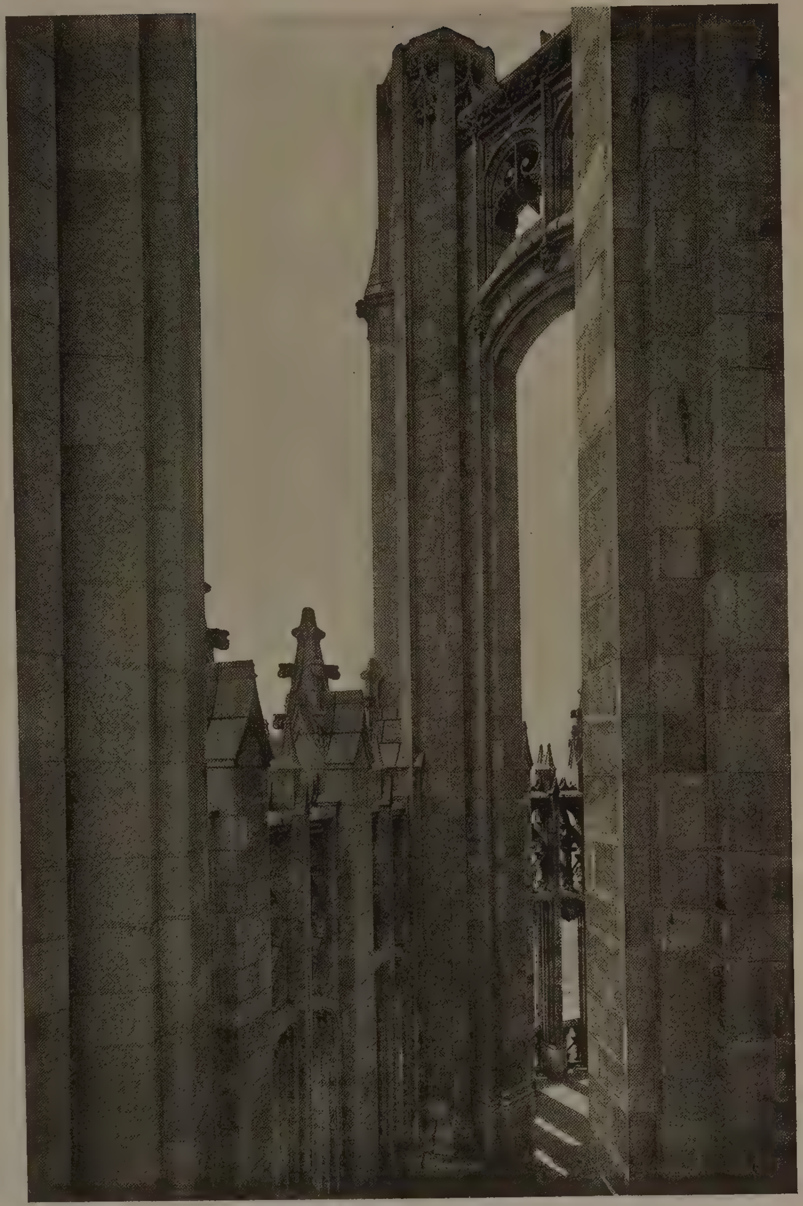
Prizes will be awarded by the building committee as follows: First Prize, $150; second prize, $100; third prize, $50. The jury reserves the right to withhold any prize if in their opinion an award is not deserved.

[illegible] BUILDING, CHICAGO, ILLS.

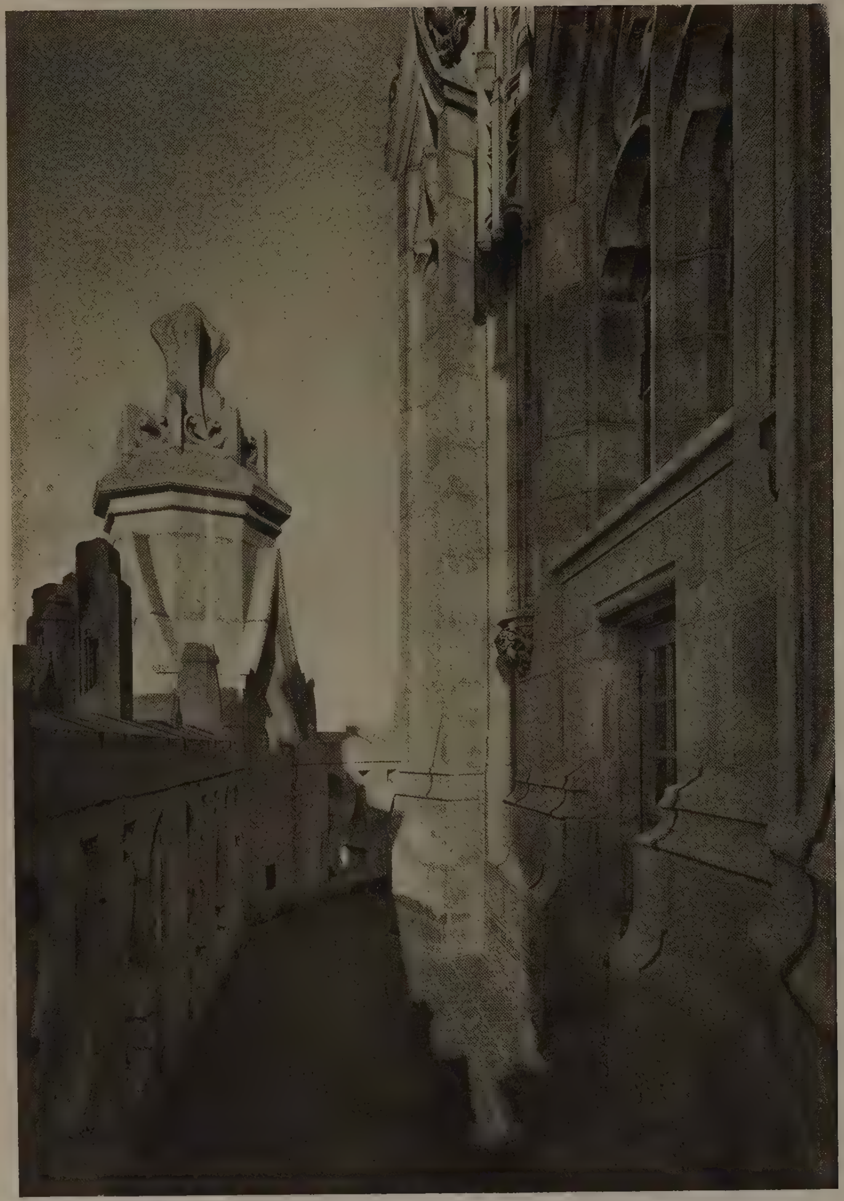
John Mead Howells and Raymond M. Hood, Associated Architects.



MAIN ENTRANCE (PANELS NOT YET CUT), CHICAGO TRIBUNE BUILDING, CHICAGO, ILLS.
John Mead Howells and Raymond M. Hood, Associated Architects.



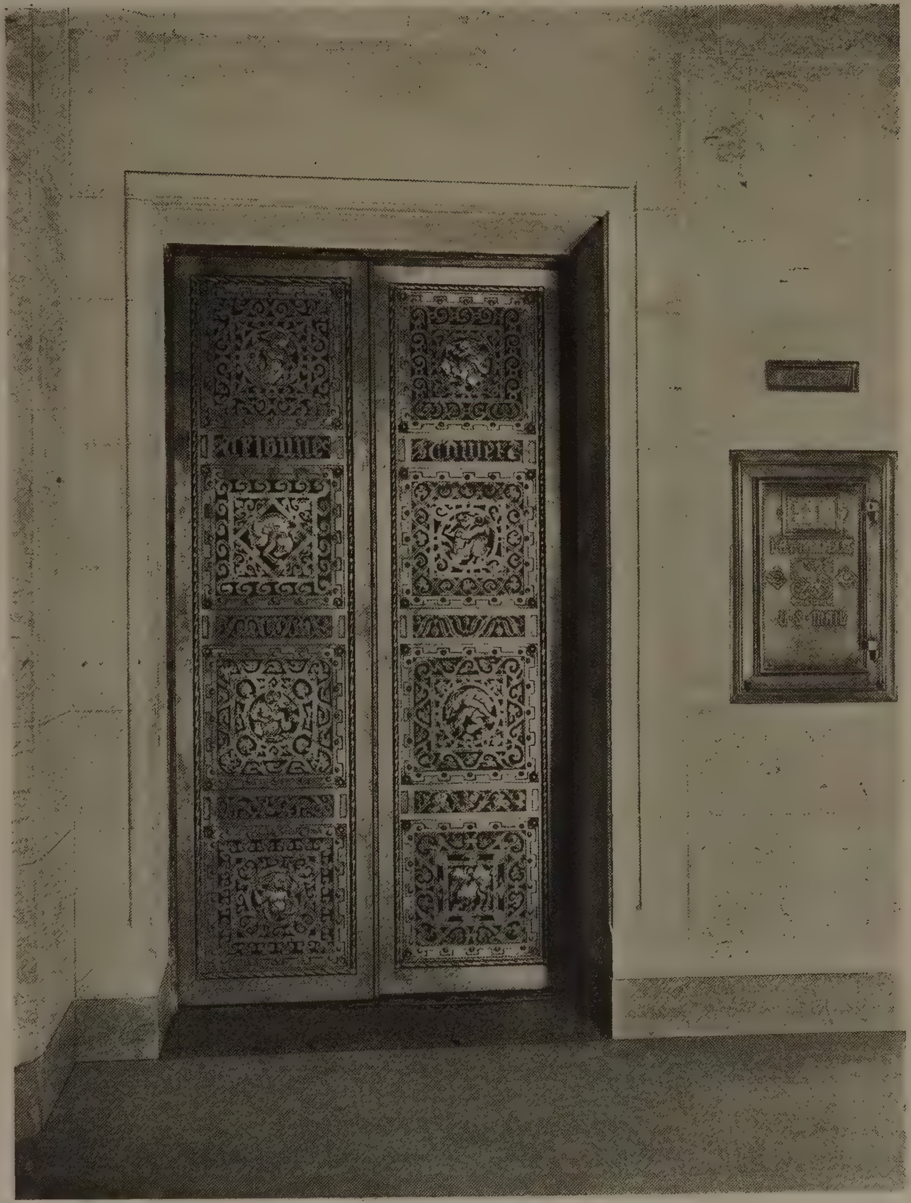
TOURELLE AND GOTHIC SCREEN AT TWENTY-FIFTH FLOOR.



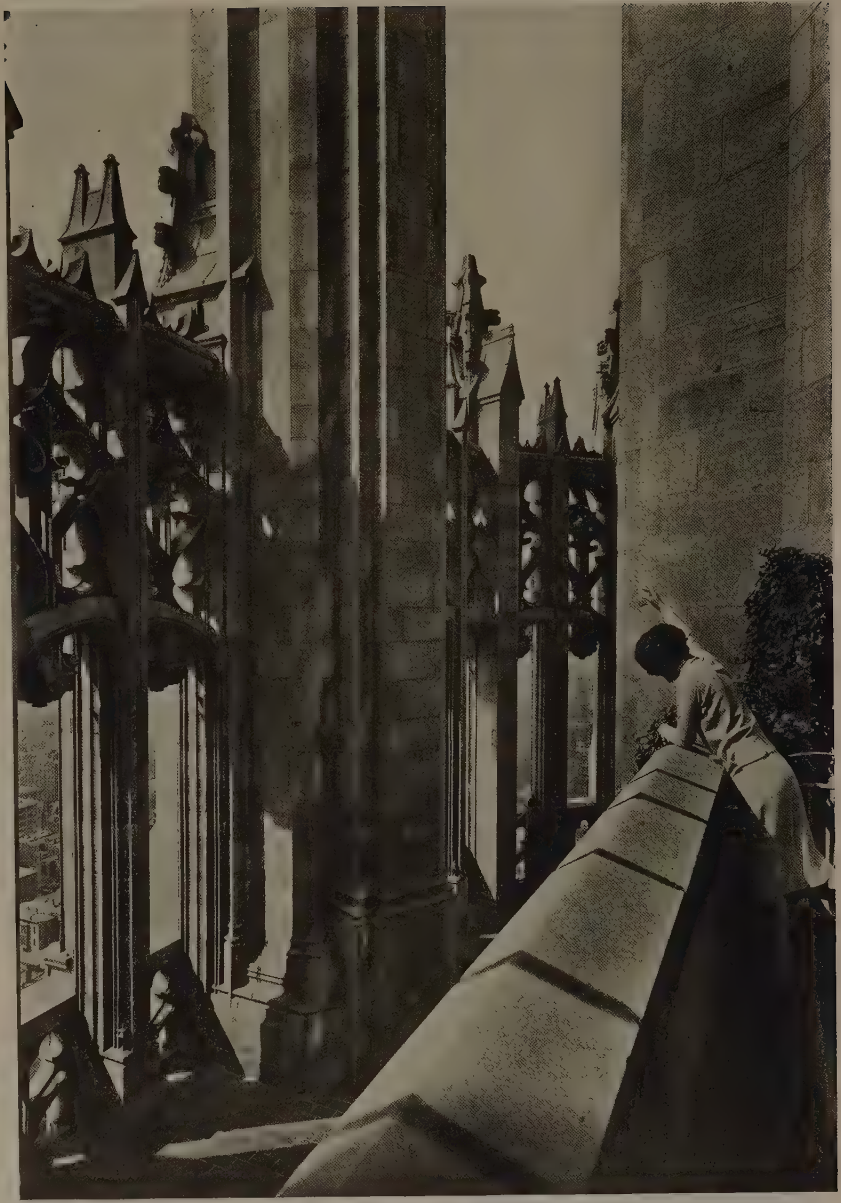
TERMINAL AT TOP OF WING, TWENTIETH FLOOR.

CHICAGO TRIBUNE BUILDING, CHICAGO, ILLS.

John Mead Howells and Raymond M. Hood, Associated Architects.



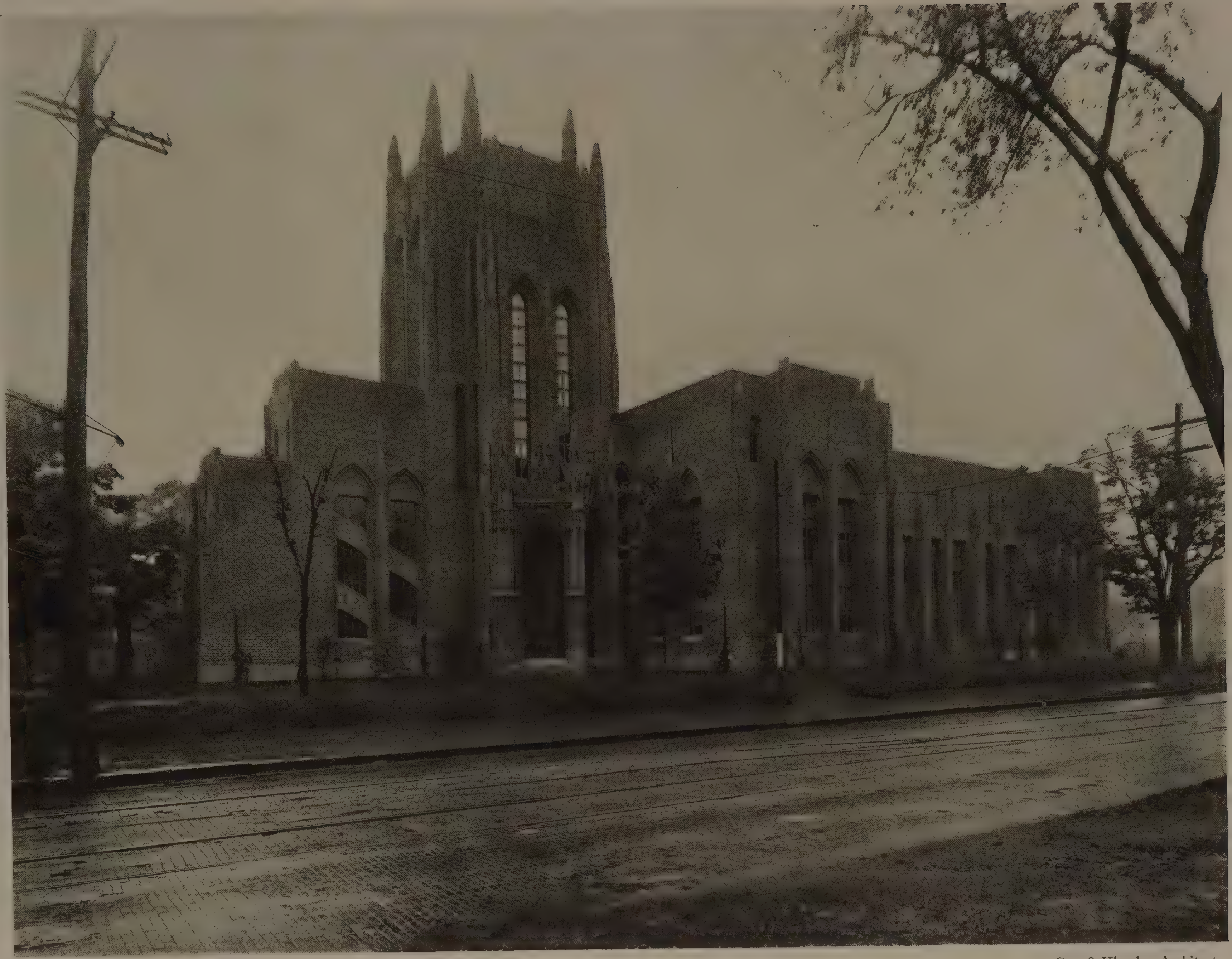
ELEVATOR DOORS.



LOOKING DOWN ON TERRACE AT TWENTY-FIFTH FLOOR.

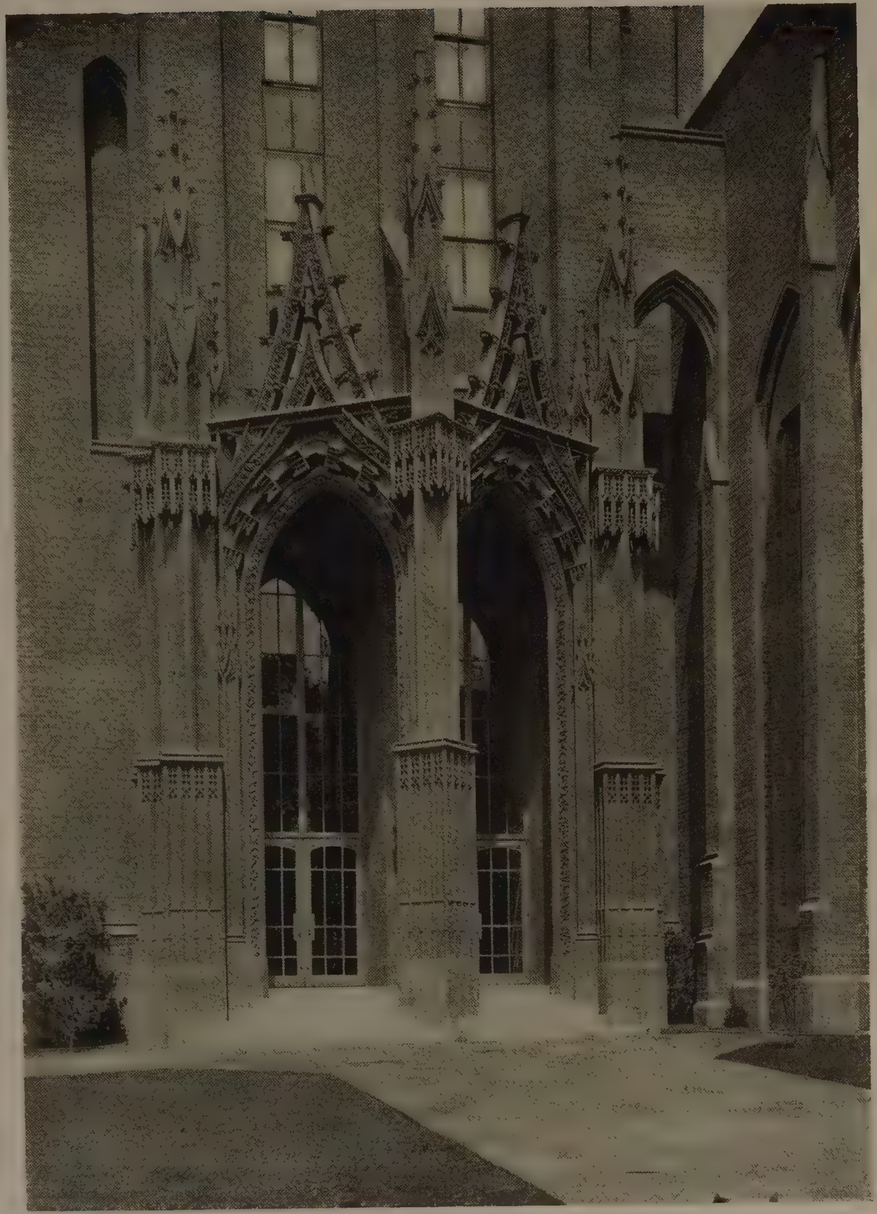
CHICAGO TRIBUNE BUILDING, CHICAGO, ILLS.

John Mead Howells and Raymond M. Hood, Associated Architects.

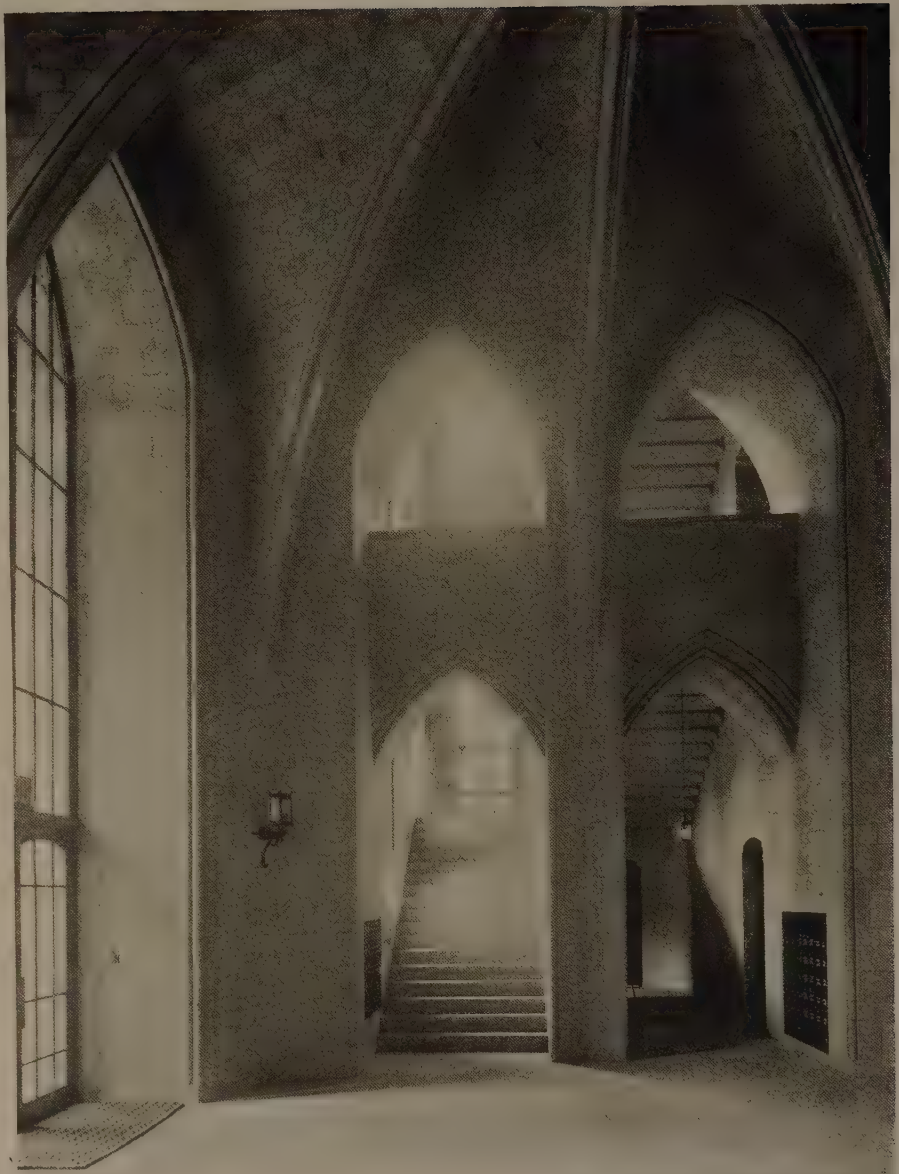


PEABODY MUSEUM OF NATURAL HISTORY, YALE UNIVERSITY, NEW HAVEN, CONN.

Day & Klauder, Architects.



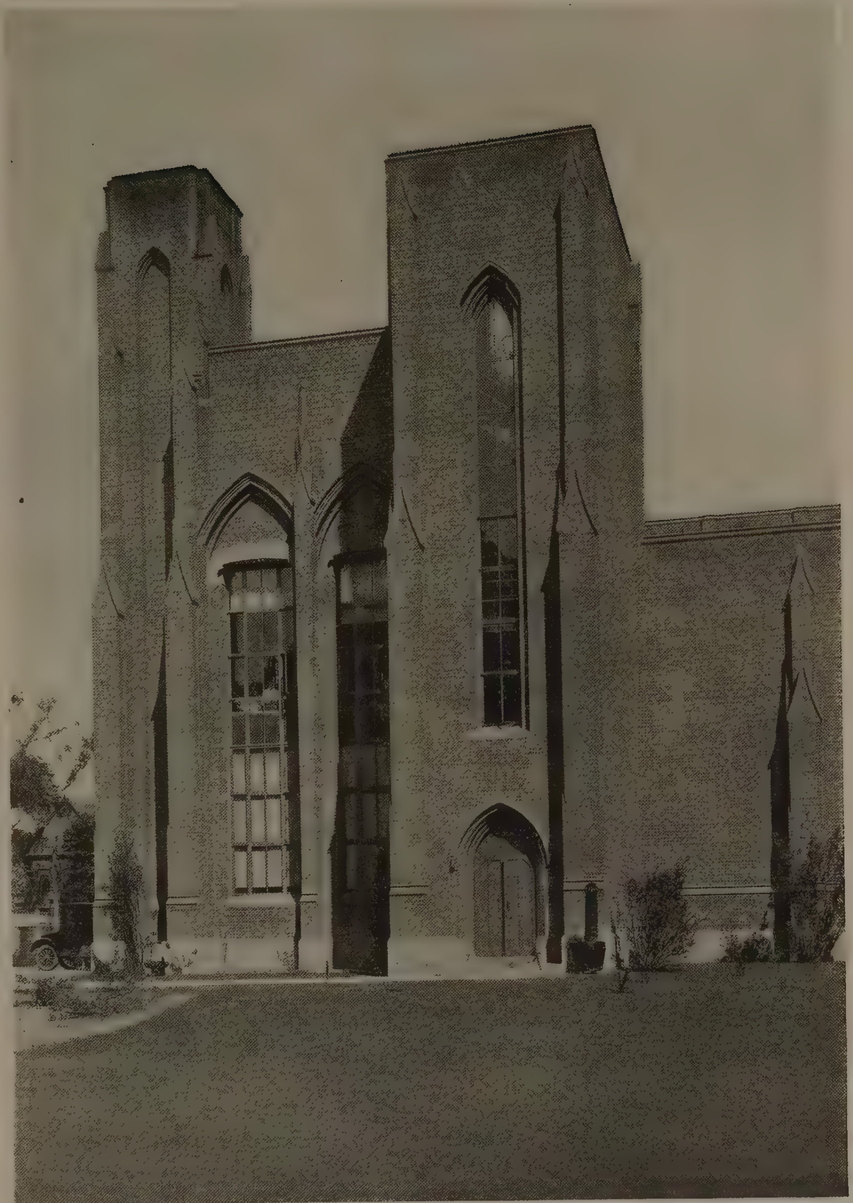
MAIN ENTRANCE DETAIL.

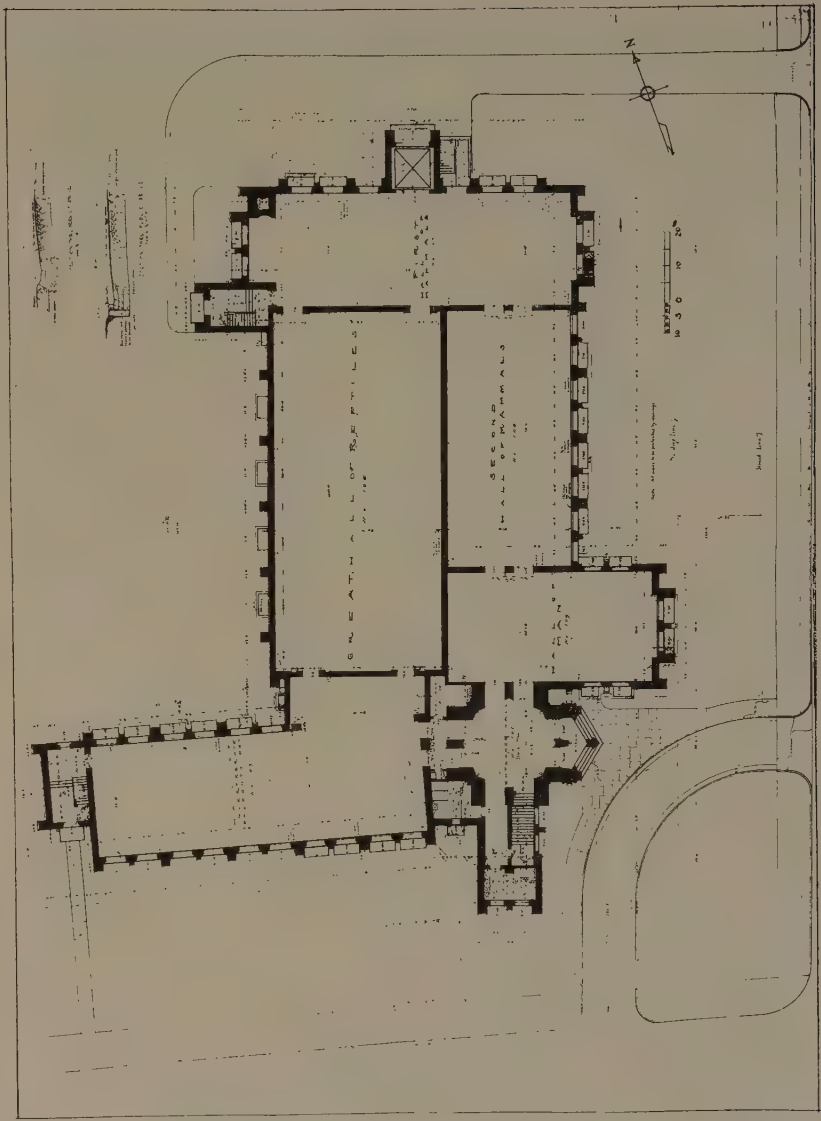


ENTRANCE HALL.

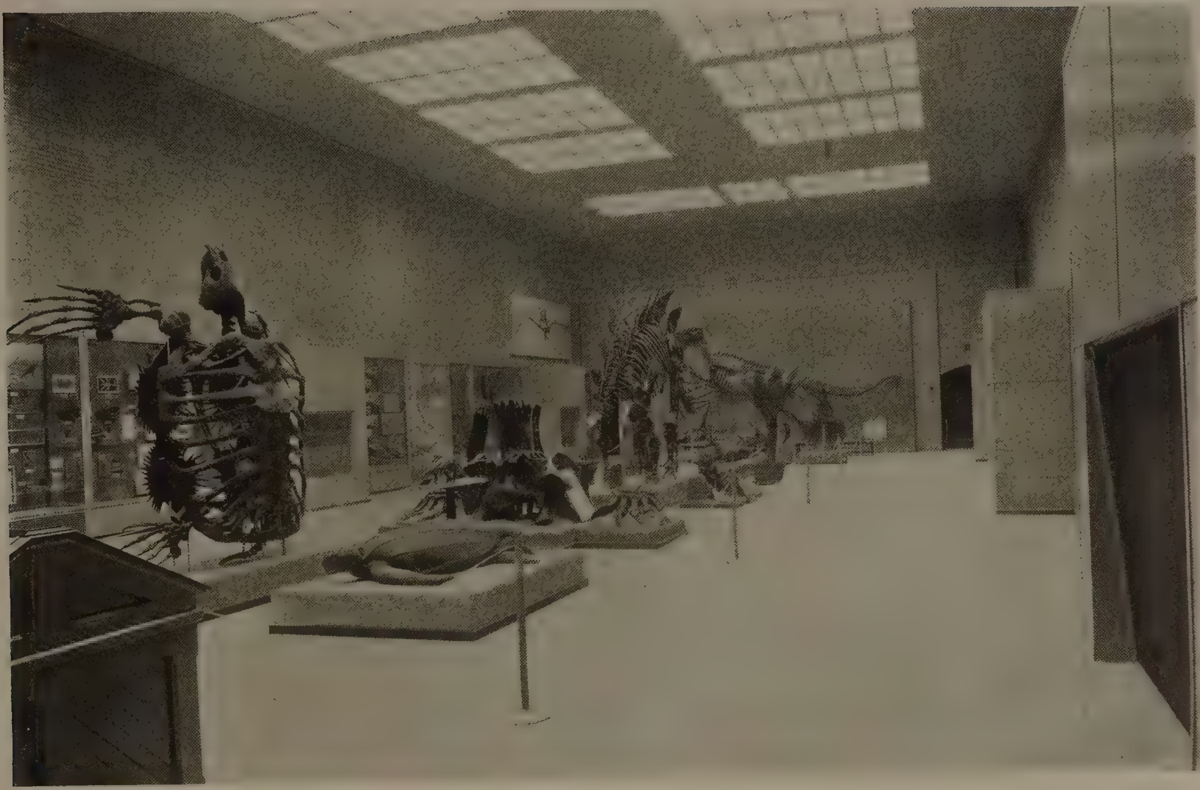
Day & Klauder, Architects.

PEABODY MUSEUM OF NATURAL HISTORY, YALE UNIVERSITY, NEW HAVEN, CONN.

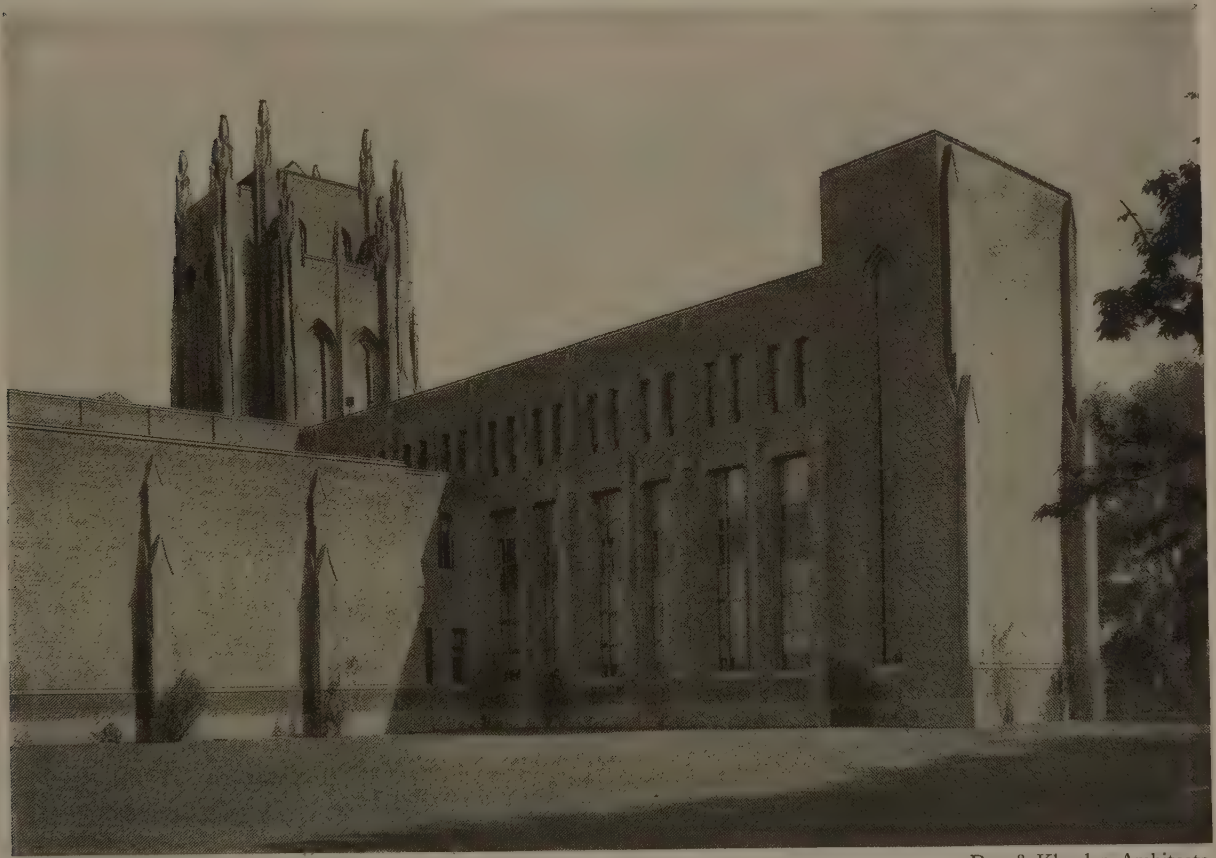




TOWER SERVICE ENTRANCE. PEABODY MUSEUM OF NATURAL HISTORY, YALE UNIVERSITY, NEW HAVEN, CONN. Day & Klauder, Architects.



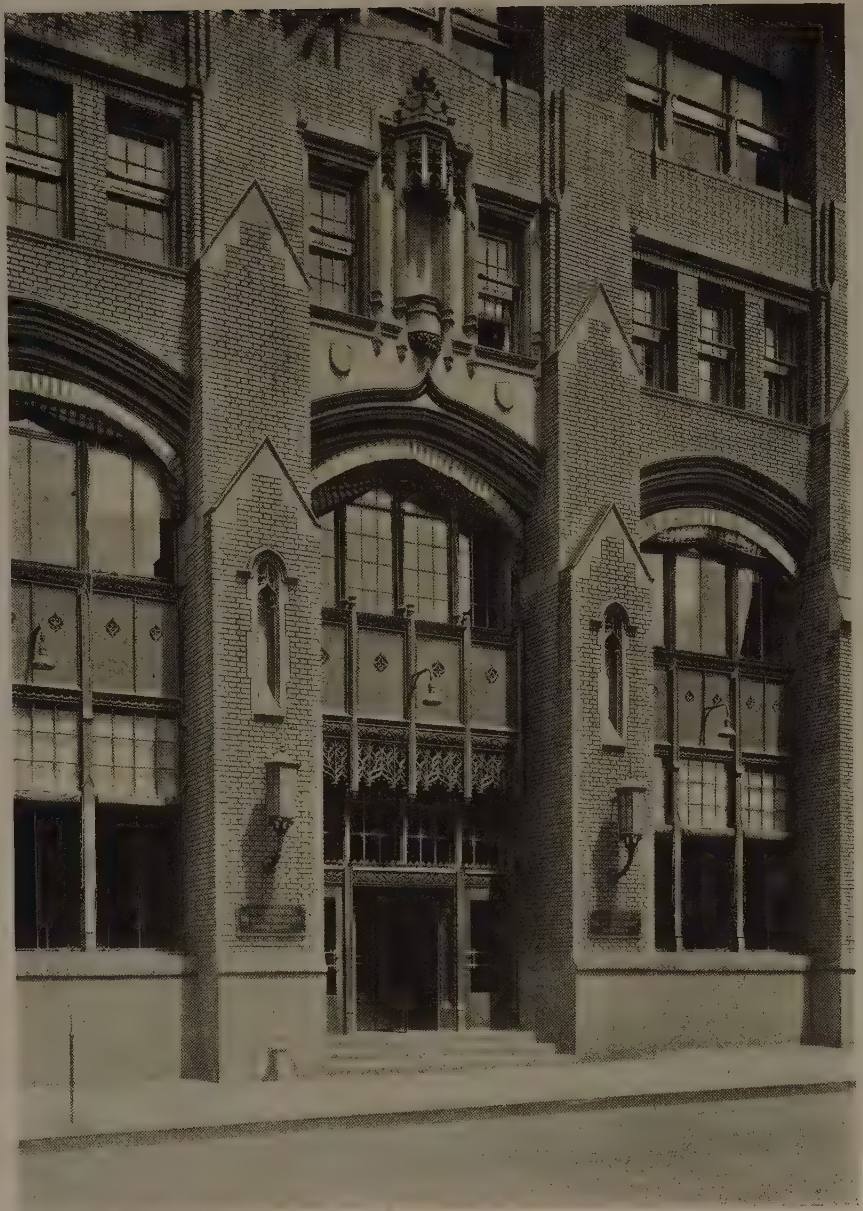
HALL OF MAMMALS.



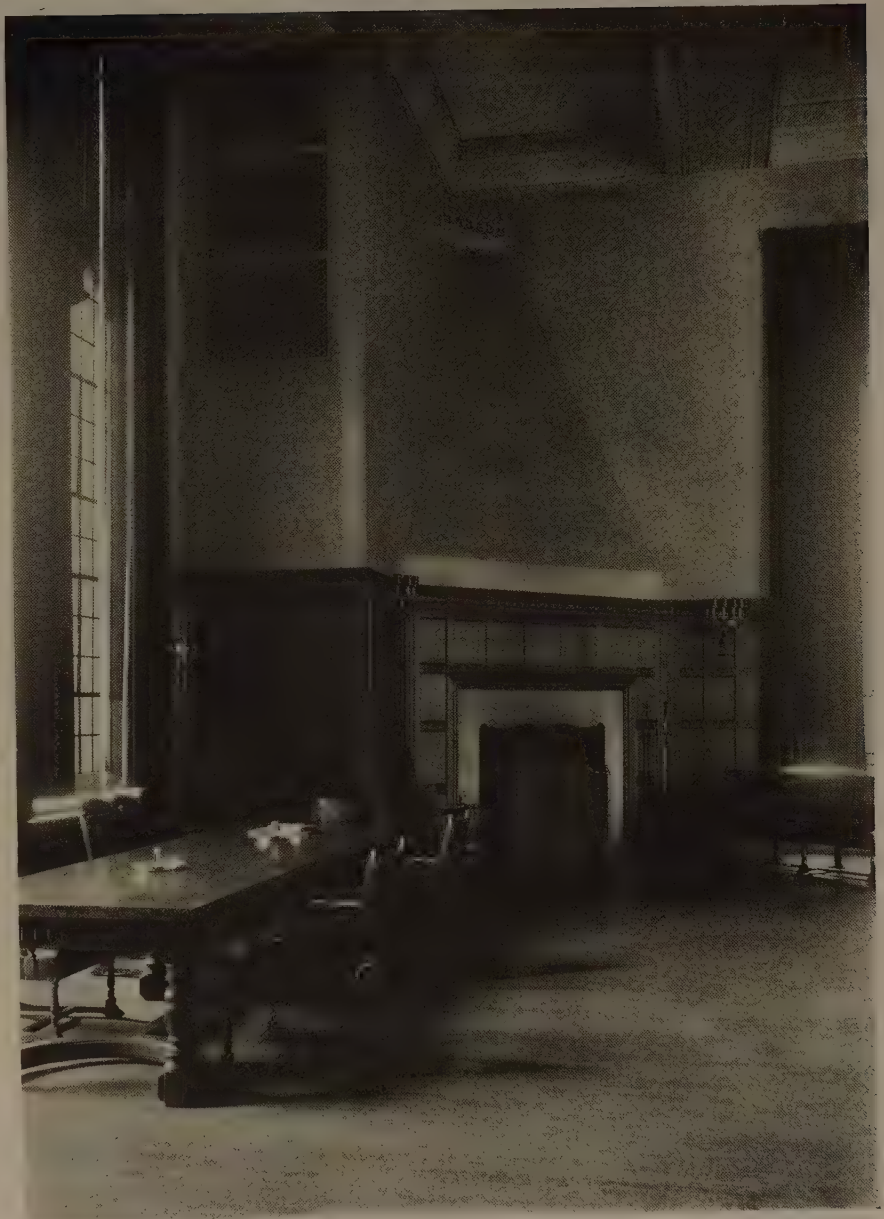
REAR.

Day & Klauder, Architects.

PEABODY MUSEUM OF NATURAL HISTORY, YALE UNIVERSITY, NEW HAVEN, CONN.



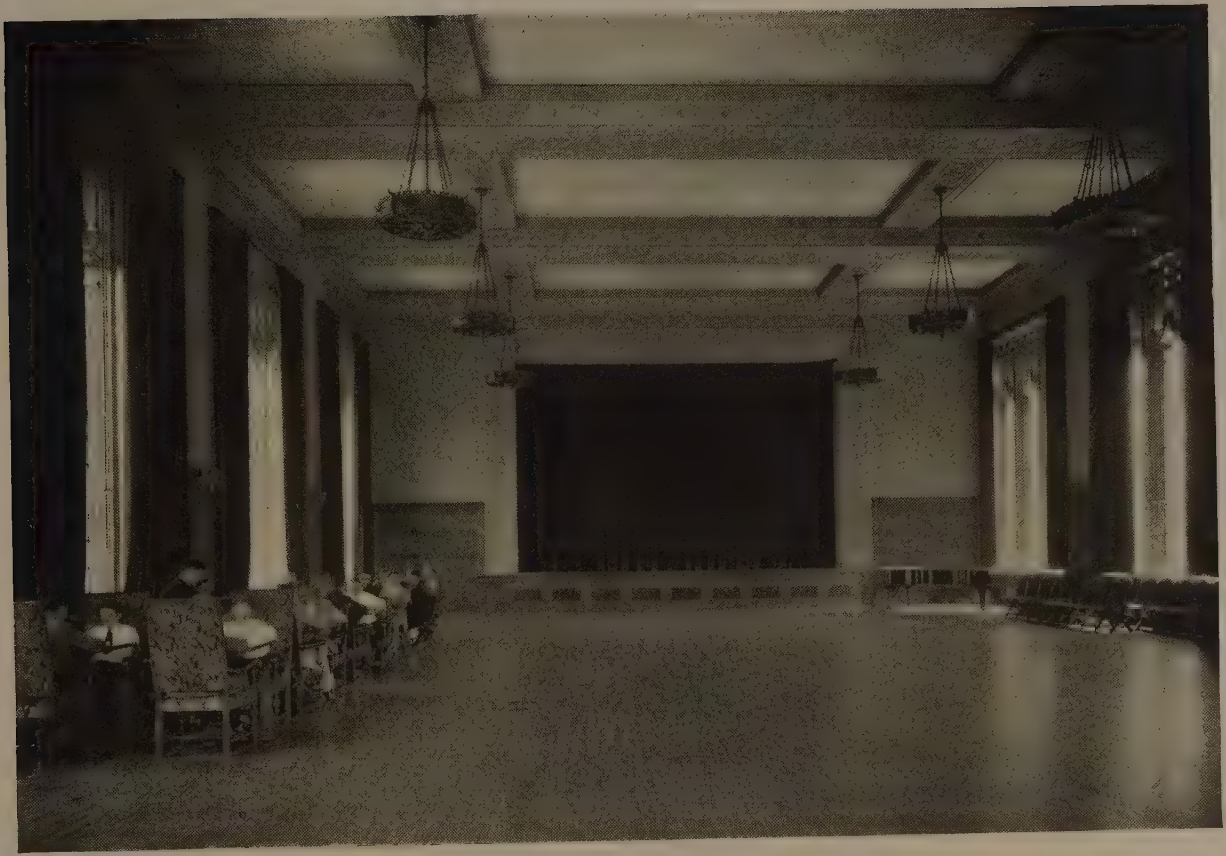
ENTRANCE DETAIL.



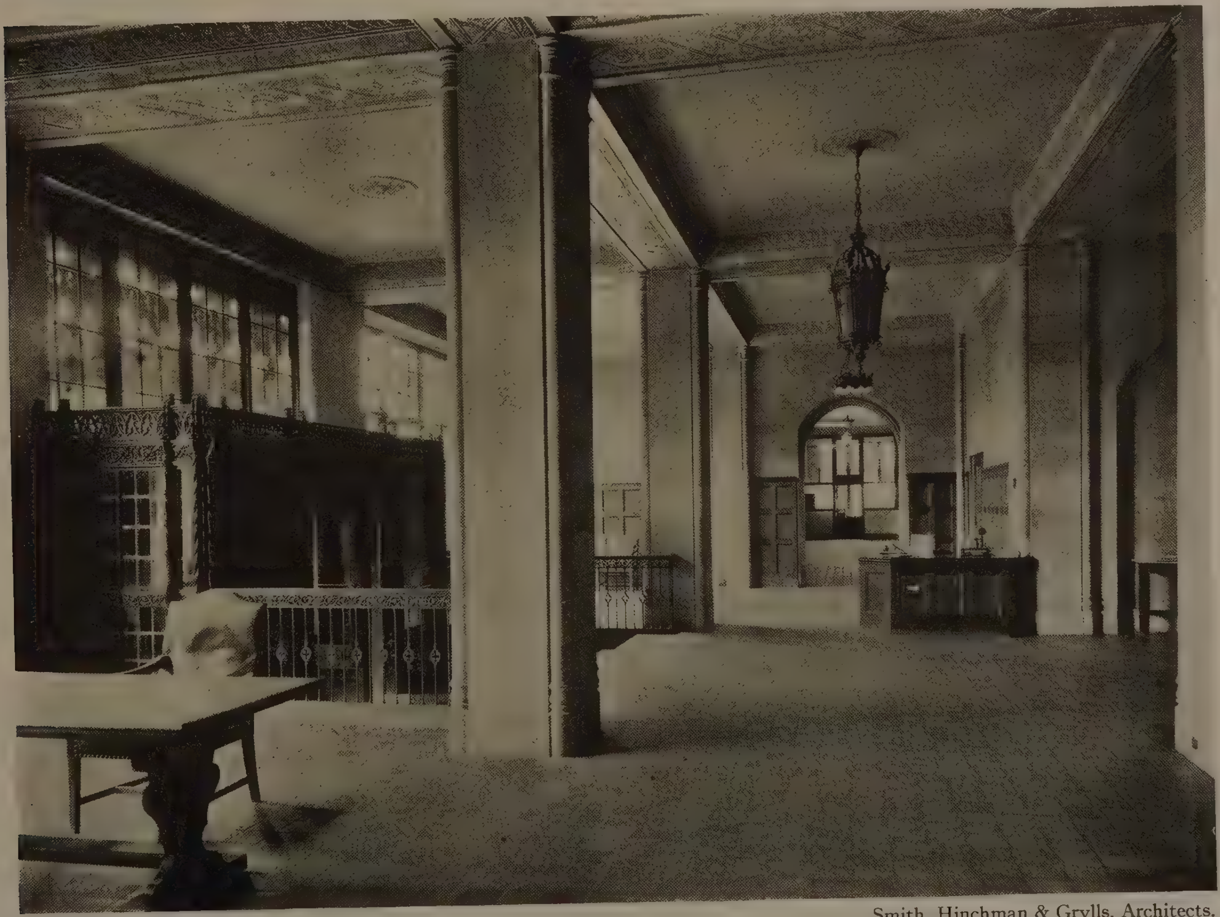
FIREPLACE IN AUDITORIUM.

Smith, Hinchman & Grylls, Architects.

DETROIT EDISON SERVICE BUILDING, DETROIT, MICH.



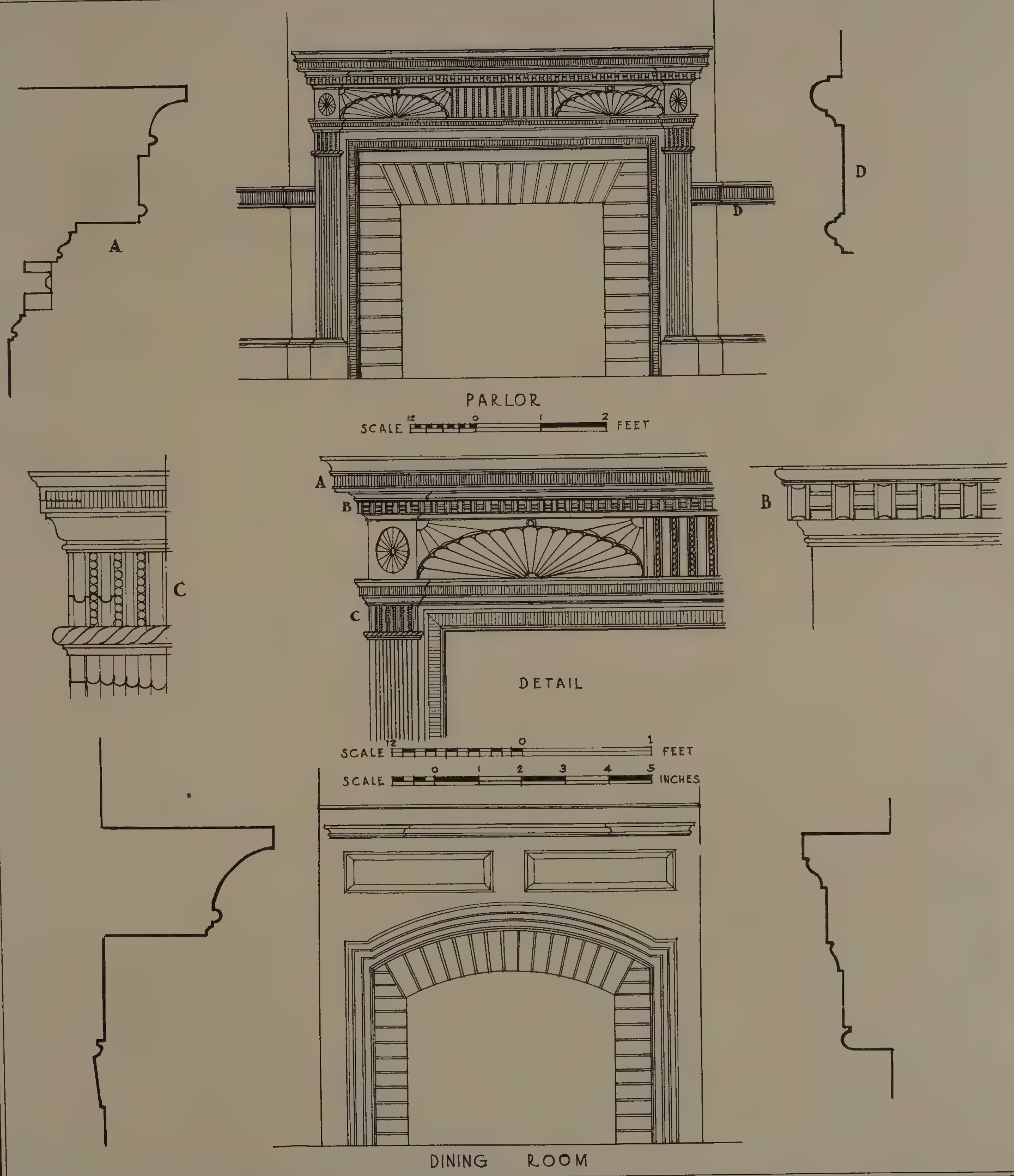
AUDITORIUM.



LOBBY.

Smith, Hinchman & Grylls, Architects.

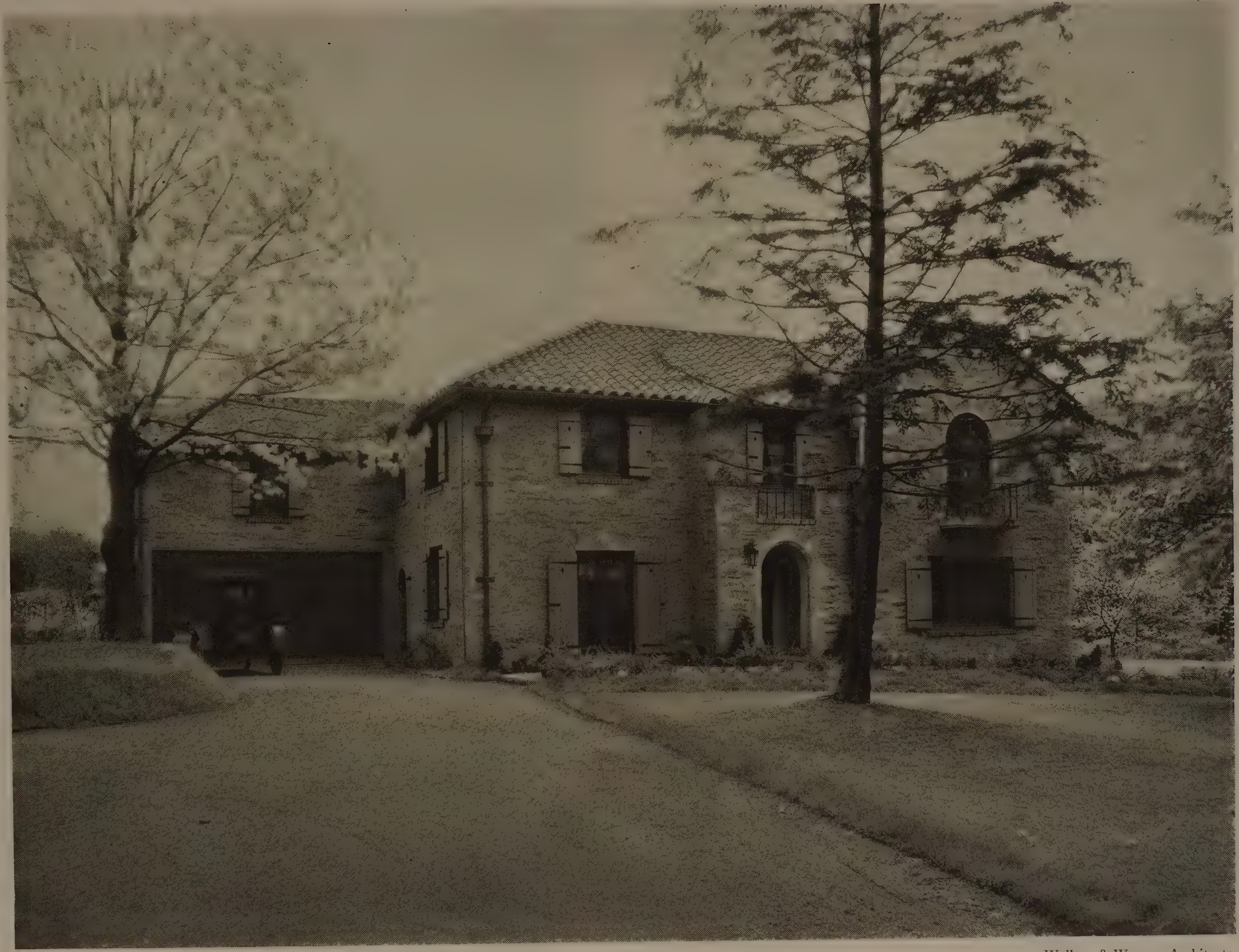
DETROIT EDISON SERVICE BUILDING, DETROIT, MICH.



COLONIAL ARCHITECTURE
OF
MARYLAND

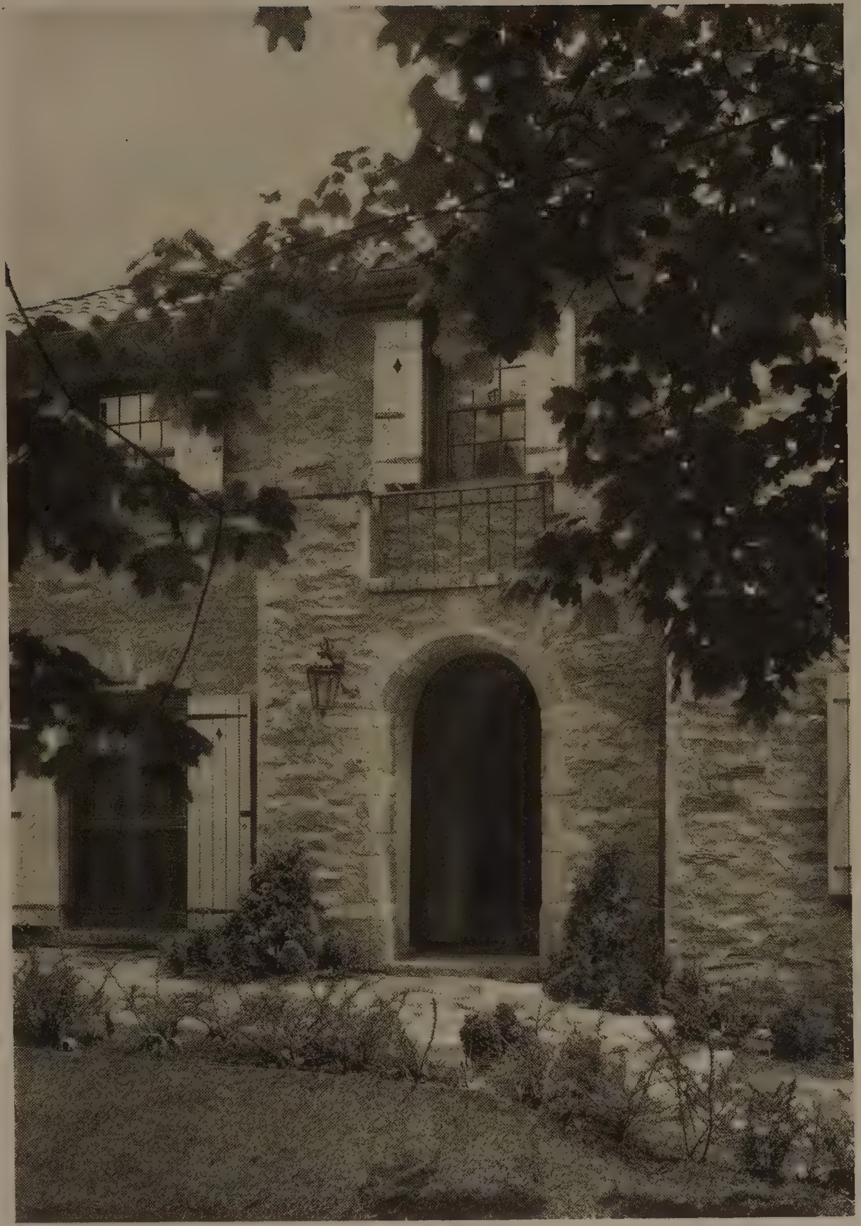
MANTELS IN TAVERN "THE MARLBORO HOUSE"
IN UPPER MARLBORO, ON THE ANNAPOLIS ROAD
PRINCE GEORGES COUNTY, MARYLAND
BUILT CIRCA 1712

MEASURED & DRAWN
BY.
ALBERT P. ERB

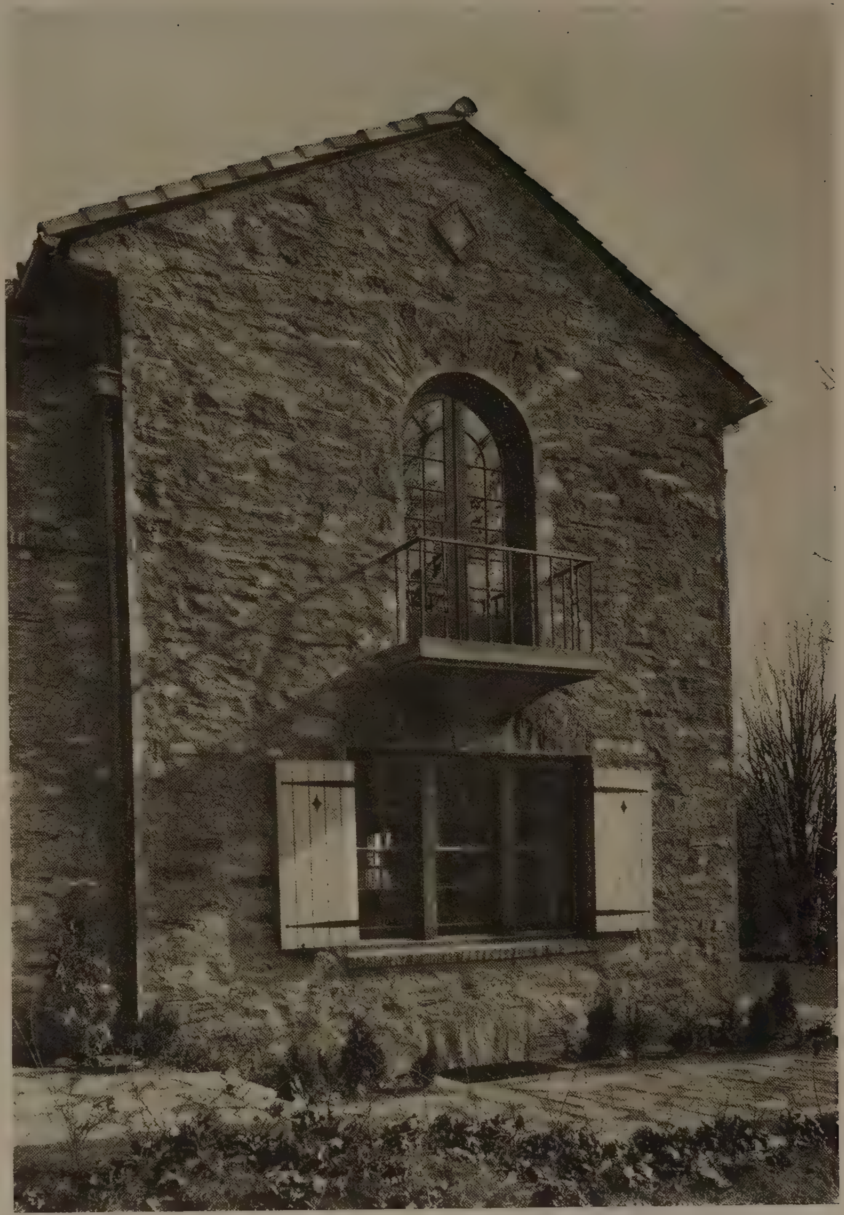


RESIDENCE, BRENTON G. WALLACE, ROSEMONT, PA.

Wallace & Warner, Architects.



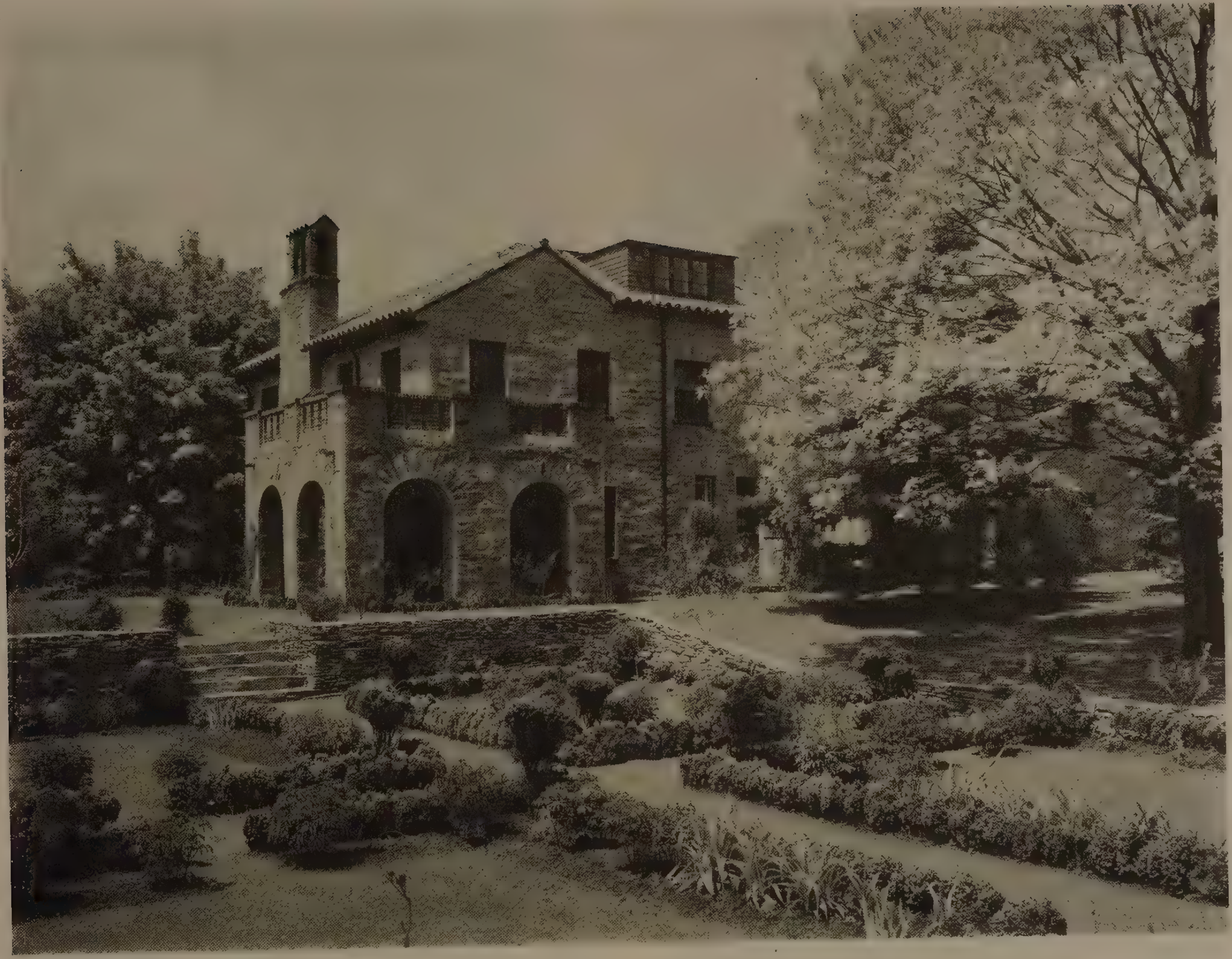
DETAIL OF ENTRANCE.



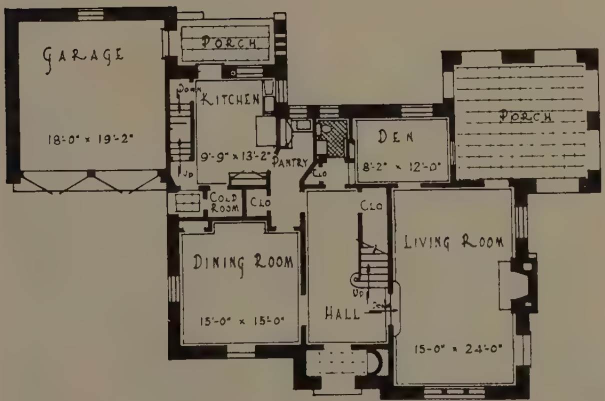
DETAIL.

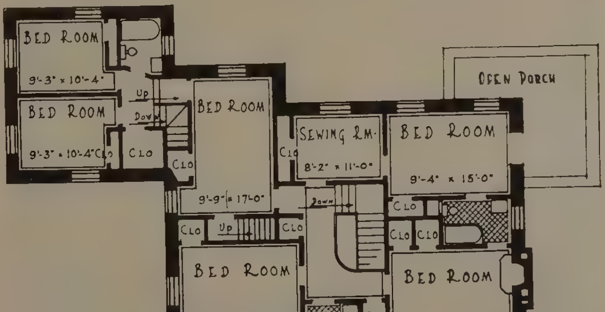
Wallace & Warner, Architects.

RESIDENCE, BRENTON G. WALLACE, ROSEMONT, PA.



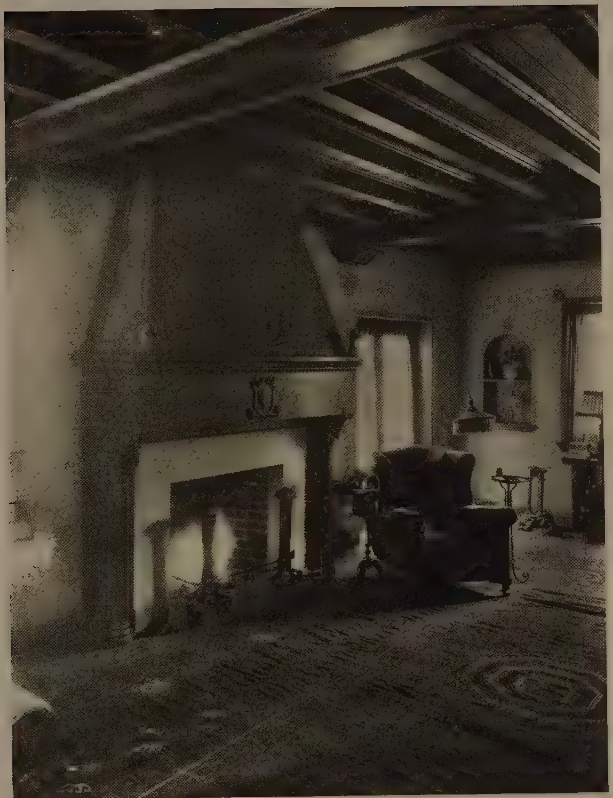
GARDEN SIDE.



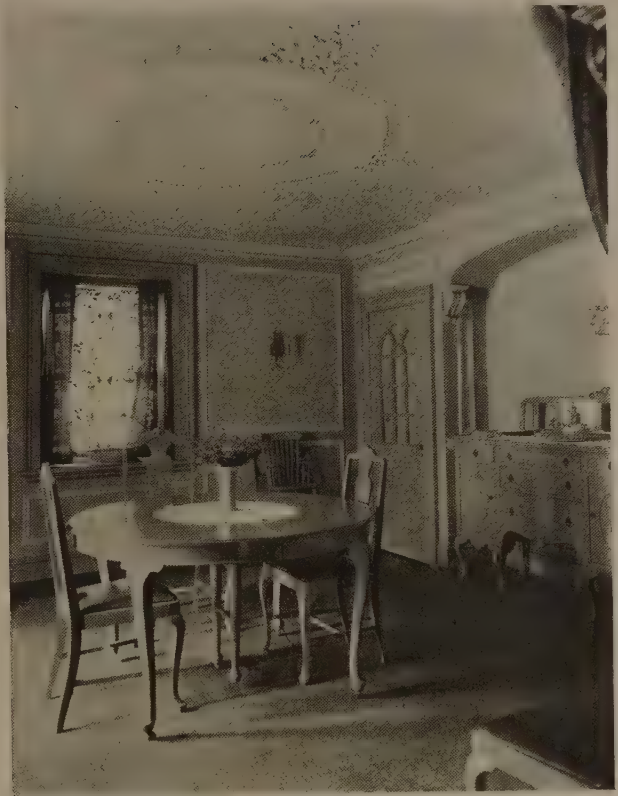


RESIDENCE, BRENTON G. WALLACE, ROSEMONT, PA.

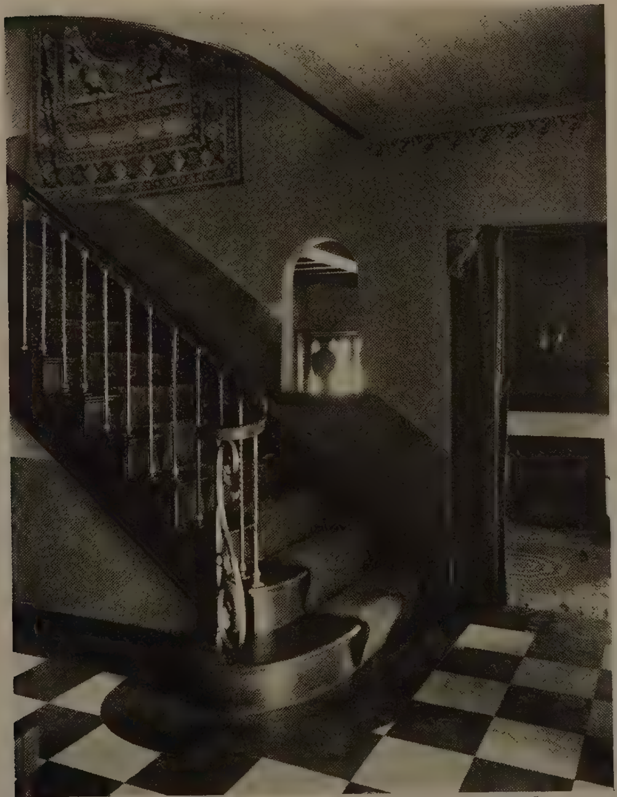
Wallace & Warner, Architects.



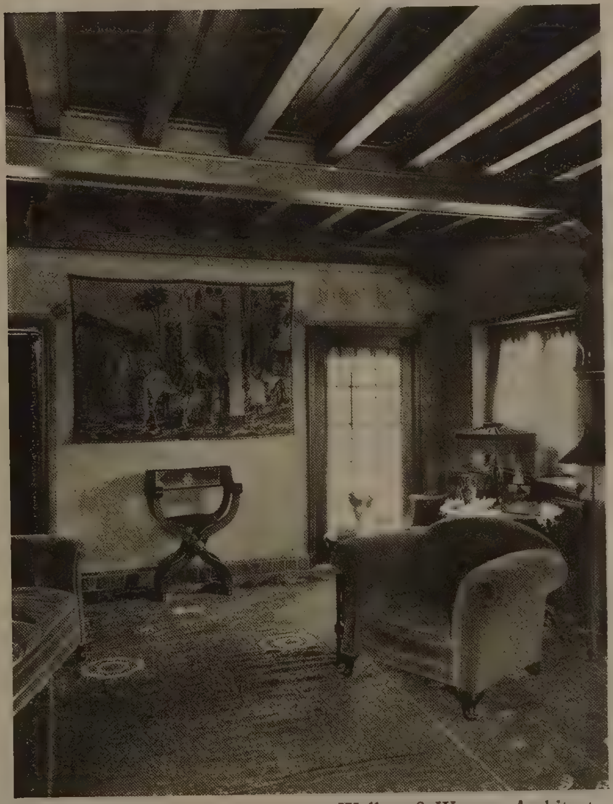
LIVING–ROOM.



DINING–ROOM.



HALL.



LIVING–ROOM.

Wallace & Warner, Architects.

RESIDENCE, BRENTON G. WALLACE, ROSEMONT, PA.

Architecture from the Standpoint of Illumination

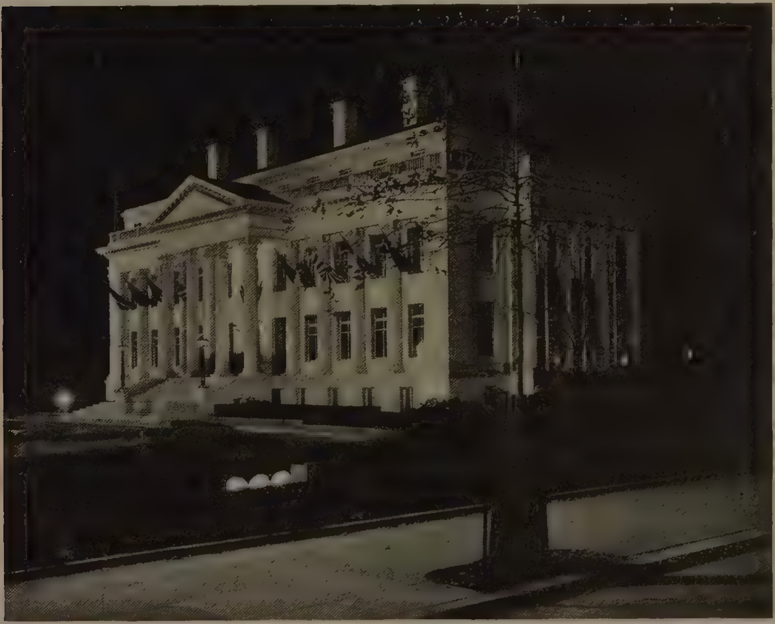
By Robert L. Zahour

Illustrations by courtesy of The Westinghouse Lamp Company

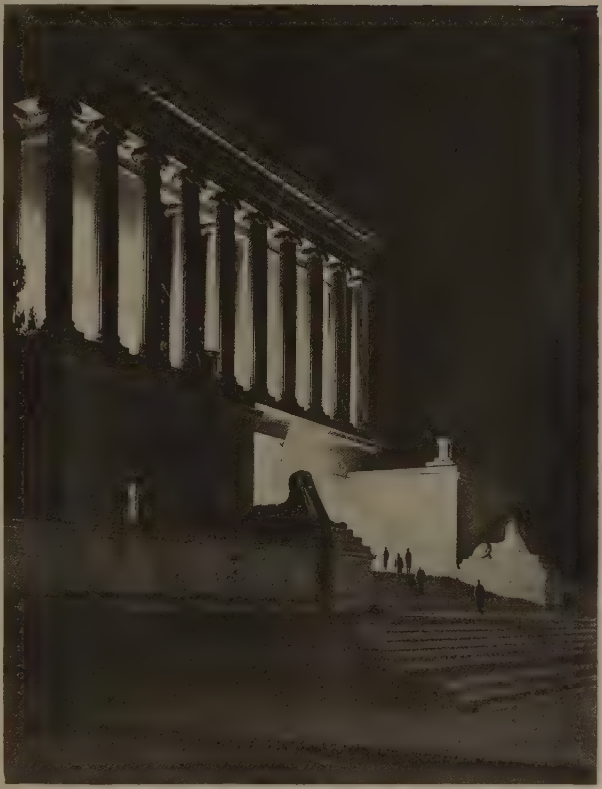
AS far back as the early stages of civilization, the love for beauty and art has ever been a great inspiration to mankind. From the time of the Stone Age to the present day, man has been continuously striving to develop the expression of beauty and grandeur in architectural design, and as a result we have to-day the fundamentals of construction as in Gothic, Greek, and Roman architecture. It is expression and beauty that appeal to and inspire man; hence, from this standpoint, the architect must do more than build a utilitarian structure. He must beautify it—make it pleasant to look upon, then make it more visible or more happily useful by any means that presents it to the eye.

No. 4. Flood-lighting.

In order that the expressiveness of a piece of architectural work be well brought out, it is very important that the illumination be proper and adequate. A painting is only beautiful when it is well lighted and easily seen. The landscape is truly beautiful under the tender rays of the evening sun, or when color and shadow enhance the vision. So it is with architecture; the architect defeats his purpose of beauty, impressiveness, and inspiration, if he overlooks the lighting of his master art.



No. 1.



No. 2. Night illumination, Temple of Scottish Rite, Washington, D.C.

A vast amount of work has been done by some of our noted illuminating engineers along the lines of exterior flood-lighting, as well as the interior lighting for elaborate homes, municipal and memorial buildings, theatre and church auditoriums. As a result of this investigation, it was found that from a psychological standpoint no medium can rival light in bringing out the expression hidden in our modern architecture. Henceforth, the success of the architect's product finally depends upon lighting for its effectiveness.

The illuminating engineer has spent years of thorough study to learn some of the important characteristics of light, and it has been found that the degree of brightness, the tone, and color of light can be easily controlled. There has been created, among many of the noted architects, a desire to illuminate exterior portions of buildings at night, in order that the expressiveness of the architectural designs will stand out distinctively against the background of darkness. Hence the art of exterior flood-lighting was developed, utilizing projection searchlights concealed by shrubbery or the cornices of the building. Photograph No. 1 shows a typical flood-lighting scheme as applied to a memorial building of artistic architectural design. A properly placed and adjusted flood-lighting system, such as this one, will cover the building with a flood of evenly distributed illumination that will bring out, clear cut and in relief, the impressive features of the architecture.

Again, modified forms of flood-lighting schemes are ofttimes employed to bring out special architectural features of a building, as illustrated by Photograph No. 2. In this case the projectors are carefully concealed in the portico so as to illuminate the columns from within as well as the main entrance way.

Another form of flood-lighting for interior illumination is shown in Photograph No. 3. Night lighting is employed on the church windows from the exterior, enabling an enjoyment of sunset effects from within the church.

One prominently located manufacturer made an advertising signboard of his plant by means of flood-lighting. Spacious lawns surrounded the building on all sides, which permitted a clear and uninterrupted view from any direction of travel. The building rises 70 feet above the knoll on which it is situated and presents a total area of over 9000 square feet on each of its four sides. In addition to this, the building is of concrete, painted white. One can, therefore, readily imagine the striking monumental effect this structure has when flood-lighted.

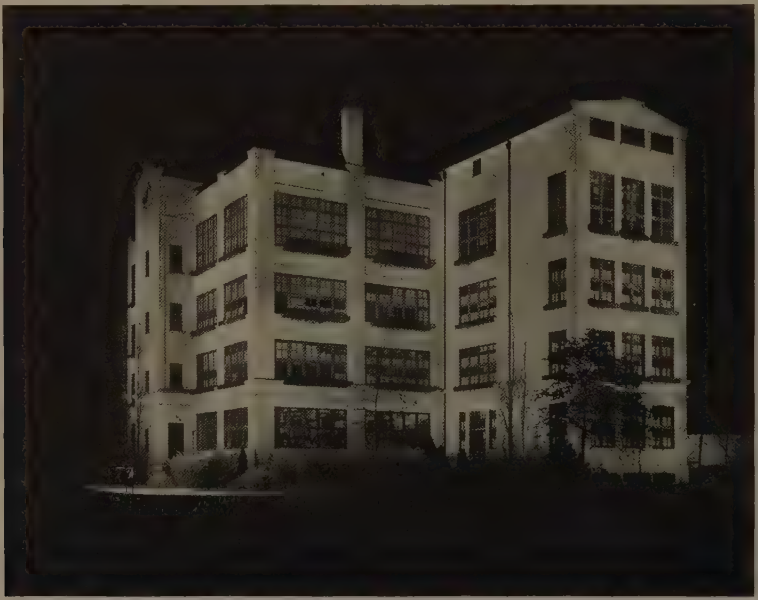
At nine different points located in a line around the building are installed the flood-lighting apparatus. The installation consists of thirty-two 500-watt Mazda flood-lighting lamps equipped with National X-ray reflectors. The projectors are on a mounting frame shown in Photograph No. 4. These frames are set in concrete under the sod and are made of two-inch pipe. The whole frame is painted with red lead for weather protection and finished in green, thus harmonizing with the lawn and shrubbery.

No. 3. Further use is expected of night illumination of church windows from the exterior, enabling enjoyment of sunset effects from within the church.

Lead-covered cable is used, through which all wire is laid underground to a weather-proof cut-out box mounted on each frame. Located on the service switchboard in the basement is an electrical time-switch by which the system is controlled automatically.

The illuminated night view shown in Photograph No. 5 is of two sides taken at a distance of about one hundred feet from the building. An average of 0.41 watts per square foot, or a total of 16,000 watts for the entire flood-lighting installation, is used.

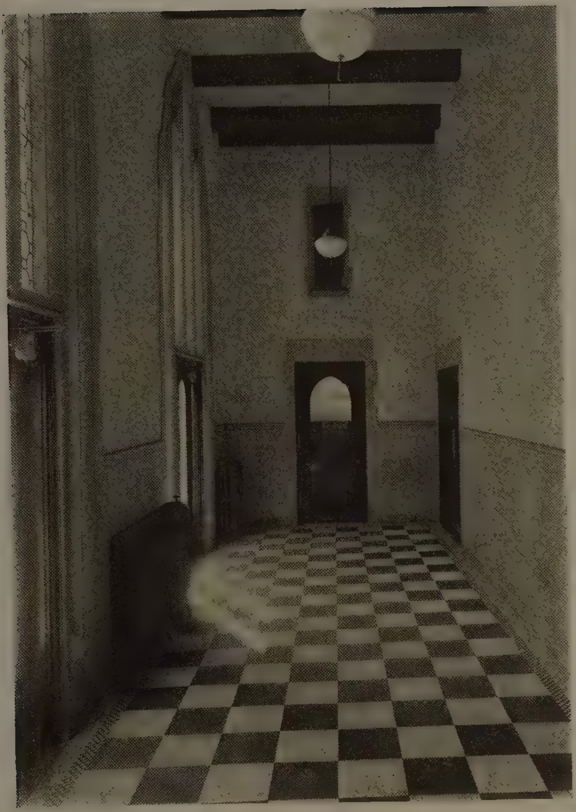
The gardener who has charge of the upkeep of the lawns, shrubbery, and trees on the surrounding grounds wipes out the reflectors and glass as part of his daily outside work. Hence the maintenance cost is very small, especially when, as is often the case, the electric power used at off-peak hours may be supplied at an especially low rate.



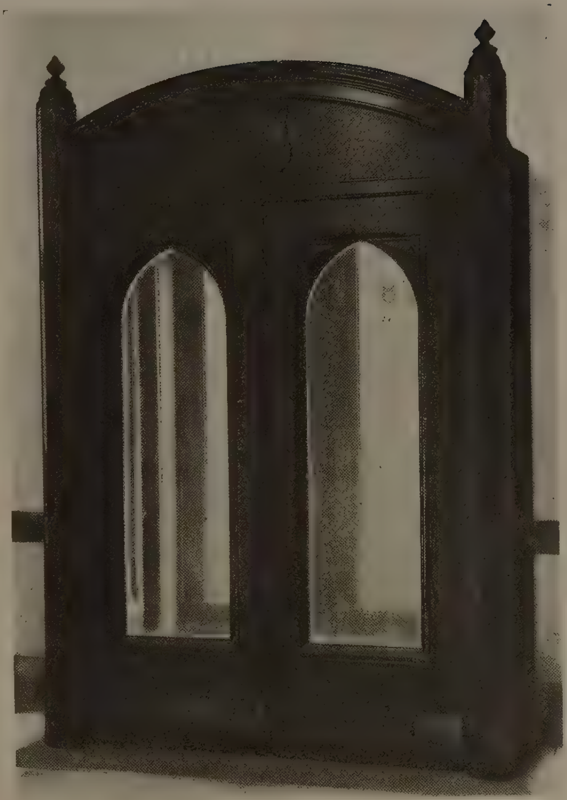
No. 5. Flood-lighting installation, Wheatena Company, Rahway, N. J.

PLANS, SALVATION ARMY HEADQUARTERS, PITTSBURGH, PA.

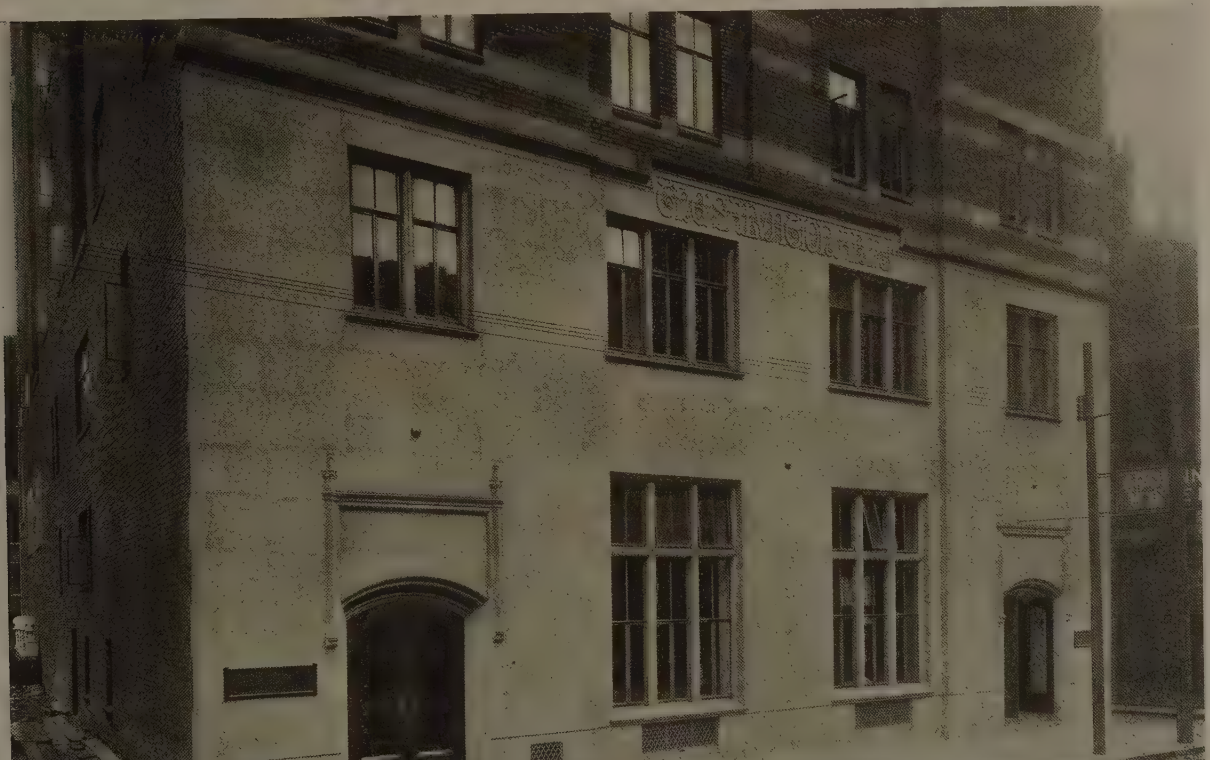
Thomas Pringle, Architect.



FOYER.



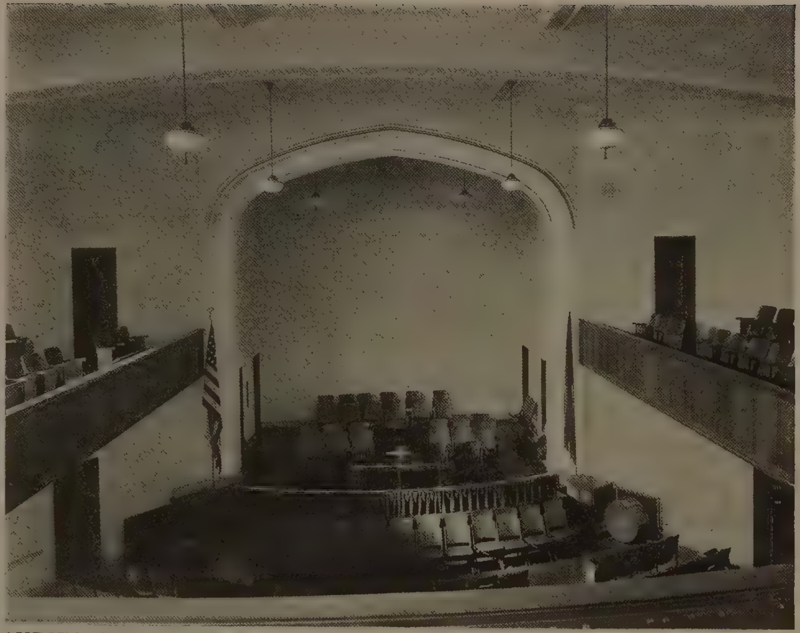
ENTRANCE VESTIBULES.



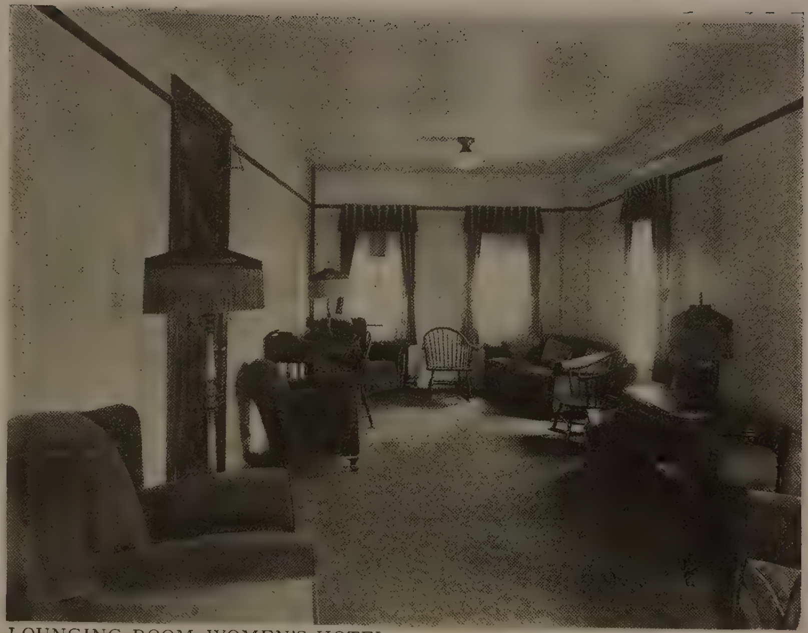
DETAIL AT THIRD AVENUE FRONT.

Thomas Pringle, Architect.

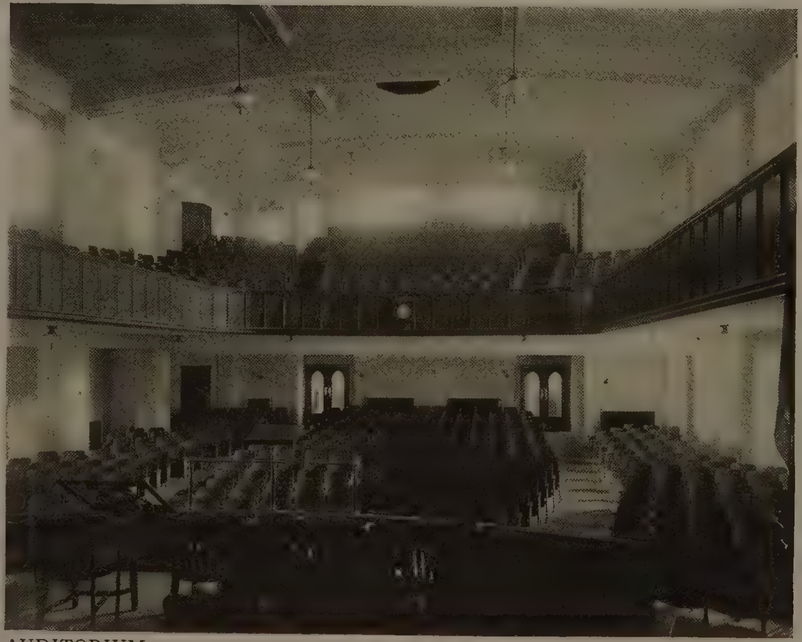
SALVATION ARMY HEADQUARTERS, PITTSBURGH, PA.



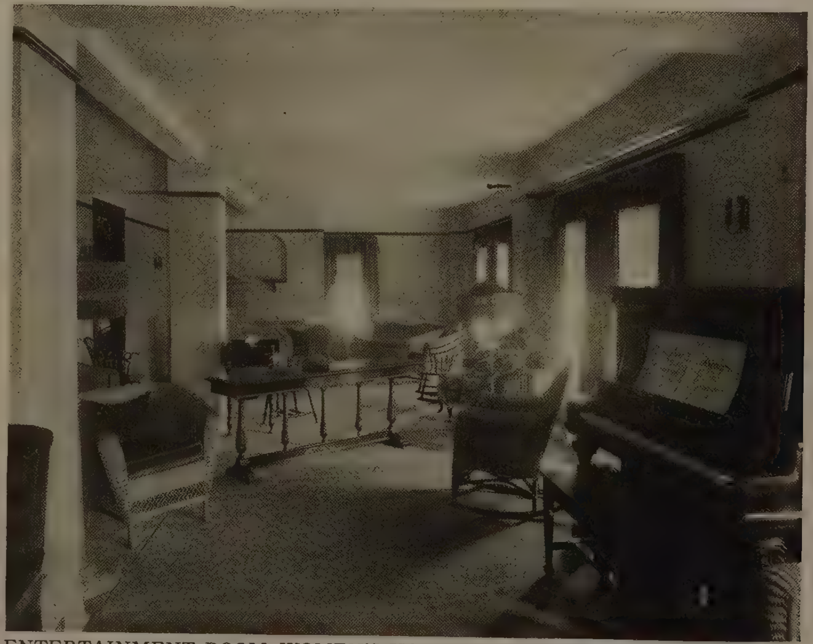
AUDITORIUM, TOWARD PLATFORM.



LOUNGING-ROOM, WOMEN'S HOTEL.



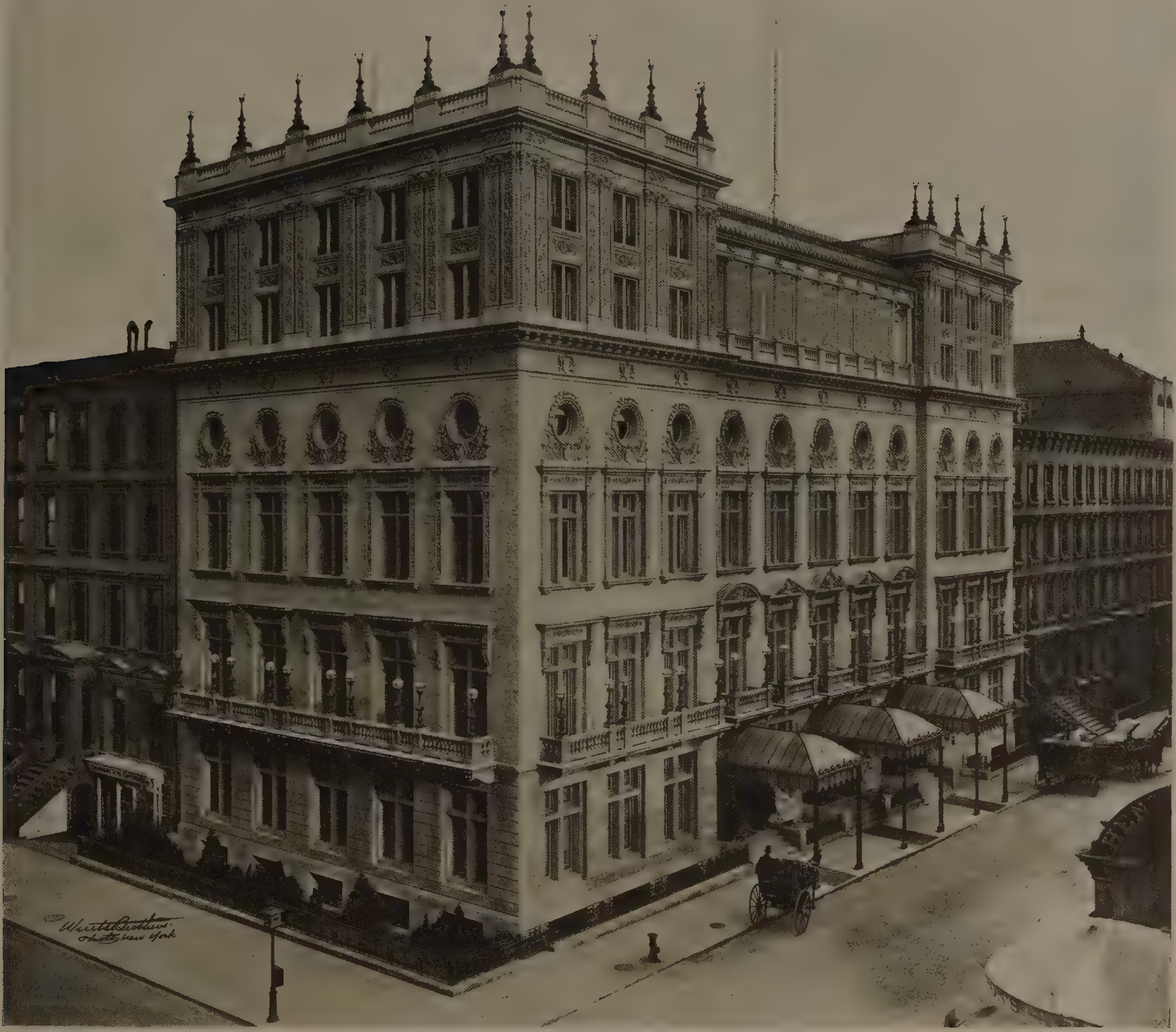
AUDITORIUM.



ENTERTAINMENT ROOM, WOMEN'S HOTEL.

Thomas Pringle, Architect.

SALVATION ARMY HEADQUARTERS, PITTSBURGH, PA.



DELMONICO BUILDING, 44TH STREET AND FIFTH AVENUE, NEW YORK CITY. RECENTLY DEMOLISHED.
James Brown Lord, Architect.
View taken just after the building's completion, showing the neighborhood conditions twenty-nine years ago.

On the Passing of Delmonico's, an Architectural Landmark

By F. S. Laurence

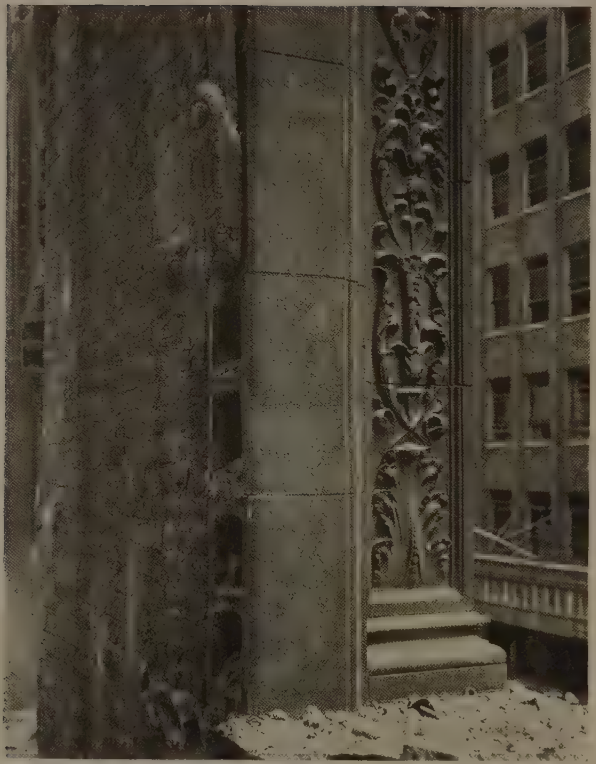
SEPTEMBER of this year has witnessed the passing of a building which for three decades has held a prominent place in the affections of the New York City public. Delmonico's is now no more.

All that remains as these lines are written are a few ragged fragments of the ground-floor walls, with here and there the lower portion of a steel column projecting above the broken masonry. A hideous gap yawns at the northeast corner of 44th Street and Fifth Avenue, once one of the show corners, architecturally, of the metropolis.

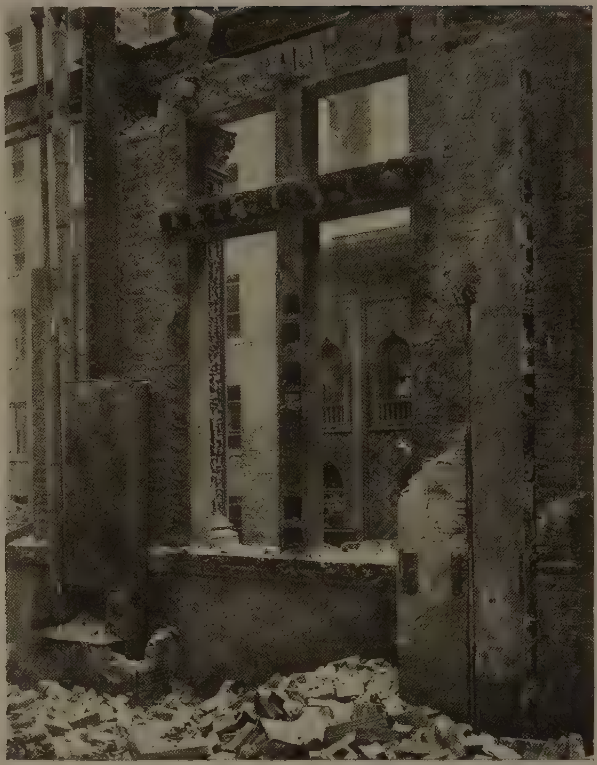
Once one of the show corners! What a world of reflection this statement conjures up,—the changes which have taken place not only in the customs and social life of the city, but in the buildings which were the outward manifestation of these, typifying and perhaps symbolizing their essential significance, writing the story of their day; not, alas, for future generations of New Yorkers to read.

For these things we do not revere sufficiently to allow them to remain standing much more than a few years, twenty or thirty years at most. That is the apology for this article. Madison Square Presbyterian Church, Madison Square Garden, and now Delmonico's! Will it be the Century Club next, or what other example of our good earlier architecture which yet survives, hinting of a traditional culture and a civic background of more than yesterday's origin?

The Delmonico Building, it is true, owed its fame chiefly to the reputation of the establishment which it housed rather than to any outstanding merit of architectural design which



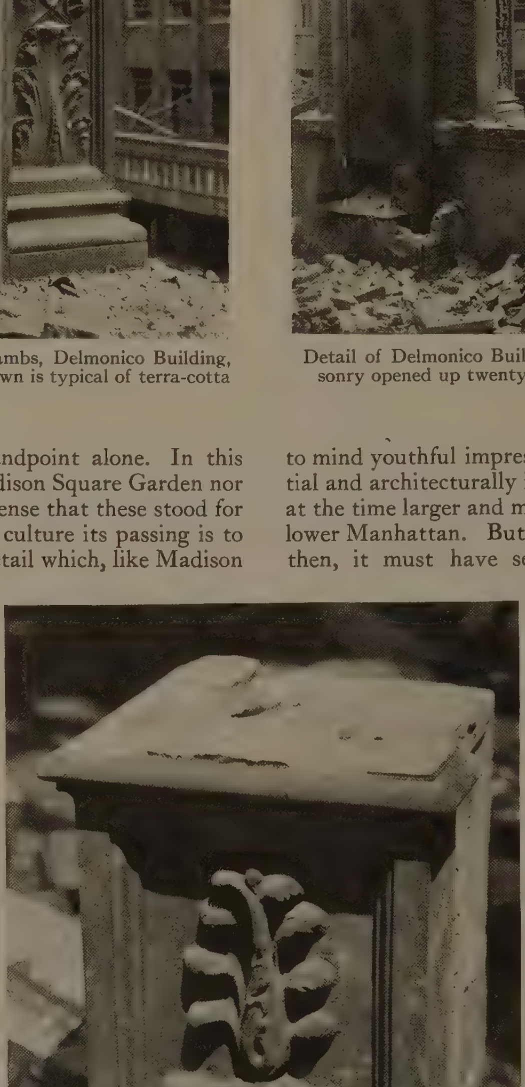
Close-up detail of terra-cotta window jambs, Delmonico Building, during demolition. The condition shown is typical of terra-cotta and brick work throughout.



Detail of Delmonico Building, showing condition of steel and masonry opened up twenty-nine years after erection.

should perpetuate it from that standpoint alone. In this sense it is not to be classed with Madison Square Garden nor the Century Club, but in the same sense that these stood for certain aspects of New York City's culture its passing is to be lamented. Of an ornateness in detail which, like Madison Square Garden, is not commonly found in our recent building work, the general sense was one of dignified restraint and mellow, unostentatious richness, which was steadying to the mind in the surrounding scramble of towering, sky-piercing structures which have begun to shut in "The Avenue" during the past ten years. Perhaps its color was one explanation of this. The soft, deep-yellow buff of its brick and terra-cotta façade was as grateful to the sense as the permeating warmth of a glass of old wine in the far-off days when Governments were human.

It is interesting to compare the building's last aspect before the wreckers took hold with that which it must have presented in contrast to its immediate surroundings when first erected. The view published herewith, page 419, dating from the brownstone front and hansom cab era, vividly illustrates this and calls to mind youthful impressions of something wonderfully palatial and architecturally important. Not that we did not have at the time larger and more imposing buildings, especially in lower Manhattan. But in the heart of the district, as it was then, it must have seemed of outstanding architectural consequence.

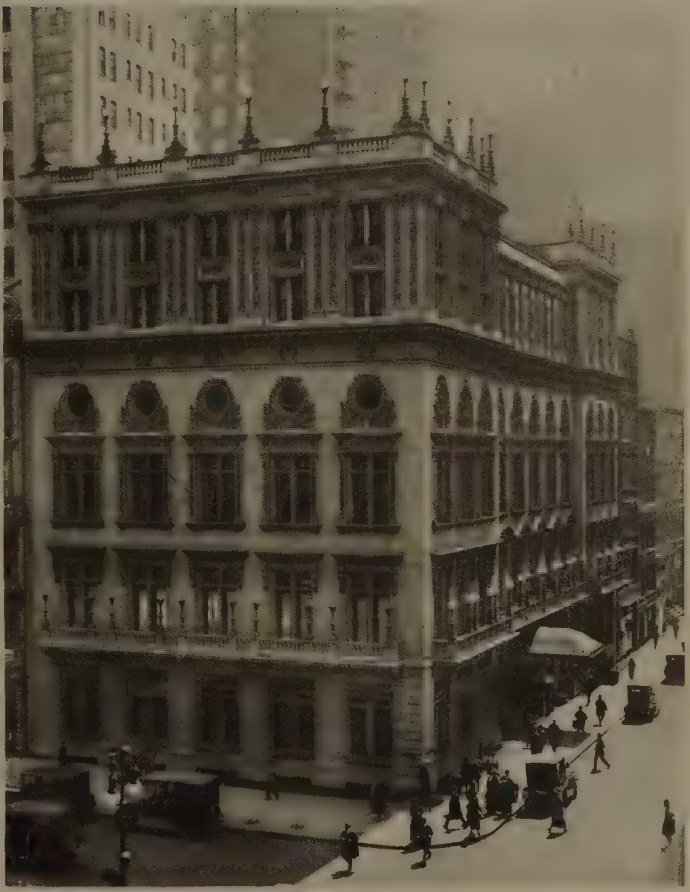


Piece fron terra-cotta pilaster, Delmonico Building.

All these reflections, however, should be left properly to the shade of Ward McAllister, which may yet haunt the present ruins. It would be more proper, perhaps, to devote reminiscent eulogy to the architect, James Brown Lord, whose talent gave to the city one of its fine architectural landmarks. But Mr. Lord, too, has passed, and without having opportunity to survey the results of his designing in its structural aspect as these have been revealed in its taking down. Impelled by curiosity, the writer therefore braved the shower of falling bricks, plaster, steel girders, and what not, in order to note the condition of the steel and enclosing masonry material when this had been opened up sufficiently for the purpose. Some photographs are herewith presented showing conditions in this respect. Examination of the brickwork and terra-cotta and some of the adjacent steel work discloses a practically perfect state of preservation in all these, no deterioration having apparently occurred at any point, even in the projecting features of the cornice and pediment heads of windows on the 44th Street side, where the exposure was such as to favor this through penetration of water or general climatic action.

Perhaps this may have been due to careful maintenance, as in no case were there observed any joints in which the pointing cement was loose. Neither any settlement cracks. A notable condition was the prevalent absence of anchoring devices, the terra-cotta appearing to rest for its integrity chiefly upon a solid bedding in the brick walls. The construction no doubt followed generally the ordinary masonry methods pursued in similar applications of terra-cotta and brick in early Renaissance Italy, which are to-day structurally and ornamentally intact after the lapse of many hundreds of years. The brick used was a terra-cotta brick made in the same factory which supplied the terra-cotta, the two materials so produced, like some of the early Italian work, working together in an ensemble of color and texture which realized a most pleasing unity.

This aspect was one of its distinguishing notes and is one sometimes missed in the more recent joint uses of the same materials, where the effort has apparently been to sharply differentiate and disguise the identity of terra-cotta by giving it the appearance of some other material. The photograph shown of the terra-cotta piece from one of the pilasters suggests very strongly the frank recognition of medium in the character of modelled ornament, as there were no signs of erosion to explain the soft contours and freely broad modelling, which express so well the feeling of modelled clay.


Delmonico Building, just prior to its demolition.

Contemplating the passing of the Delmonico Building, one is left to speculate upon the waste represented in the discarding of so much fine detail. In the case of Madison Square Garden, it is commonly known that all the terra-cotta work is being carefully preserved, with the view to its use in a duplication of that structure, or part of it, on some other site, and it seems a pity that the correspondingly fine and rich terracotta detail of the Delmonico Building, in the perfect state of preservation in which it has been found, could not likewise have been carefully removed to grace some other structure where it would have been appropriate. Perhaps this is the case; the writer does not know, but is led to offer the observation because there is yet more than one instance of architectural work of about the same period still standing in New York, the ornamental detail of which, like that of the Delmonico Building, is worthy of preservation and re-employment elsewhere, even if no re-erection of the structure itself is warranted upon grounds of major importance or sentimental attachment.

Book Reviews

ELEMENTS OF FORM AND DESIGN IN CLASSIC ARCHITECTURE SHOWN IN EXTERIOR AND INTERIOR MOTIVES. Collated from Fine Buildings of All Times on One Hundred Plates. By ARTHUR STRATTON, Architect, Fellow of the Royal Institute of British Architects, Reader in Architecture in the University of London, Author of "The Life of Sir Christopher Wren," "The English Interior," etc. Charles Scribner's Sons, New York.

The purpose of this book is "to supply an index to known forms of classic building, and to present an analysis of elemental plans, sections, and elevations arranged in a manner for ready reference." In the author's preface he says: "Every architect should be familiar with the motives illustrated here, while to the student they are indispensable. As they are now, for the first time, conveniently arranged for reference and comparison, the task of teachers in making them known to the student should be rendered much less arduous than hitherto. This book is one of extraordinary usefulness and practical service, and will find a valued place in the schools as well as in the architect's library. It presents, in a series of chapters and plates, a review of the principles of form and design that has been much needed. The chapter headings give, better than anything we might say, the extraordinary scope and interest of the volume: Circular Plans, Circular and Rectangular Forms United, Square Plans, The Roman "D" or Tribune Plan, Semicircular and Elliptical Plan, Octagonal Plans, Rectangular Plans Disposed for Internal Effect, Internal Corridors, Vestibules, Vaulted Loggias and Covered Approaches, Internal Staircases, Pavilions, Loggias and Open Halls, Façades Not More Than Two Principal Storys in Height, Porticoes as Frontispieces and Approaches, External Steps and Staircases, Triumphal Arches, Gateways and Porches, Screens and Colonnades, Grottoes.

ART OUT-OF-DOORS. HINTS ON GOOD TASTE IN GARDENING. By MRS. SCHUYLER VAN RENSSELAER. New and enlarged edition. Charles Scribner's Sons, New York.

This has always been one of the most delightful books on the subject, and, with the pleasure it gives in the mere reading, you acquire a lot of "practical" information on a variety of garden topics. It is a good book for the architect, the landscape architect, and a good book for clients. It might be included in a list of nature books, for there are chapters on "The Beauty of Trees," "The Love of Nature." Many city dwellers will read with peculiar interest and appreciation the chapter on "A Neglected Asset —The Ailanthus Tree." The book is not too large to stick in your pocket for a little journey, and reading it along the way will help you to a better understanding of everything you see, and a wider interest in gardens in general, "The Home Grounds, Roads and Paths, Piazzas," etc.

Building in London and Paris

By David B. Emerson

ANY one who visited London two years ago, and returned there in July of this year, could not fail to see that London has a well-developed building boom; in fact, it is safe to say that at least ten times as much work is being done to-day as was being done in the summer of 1923. In all sections of the city the tourist will see construction work going on, from the earliest stages of demolition on to the giving the finishing touches to the completed buildings.

In addition to the work which is now under way, a large number of new buildings have been completed during the past two years. By far the busiest section of the city is undoubtedly in Regent Street, which is being practically rebuilt from Piccadilly Circus to Oxford Circus, and two new buildings are being erected between Pall Mall and Piccadilly Circus.

Being somewhat surprised at the amount of work going on in this street, I counted the number of building operations between Piccadilly Circus and Oxford Circus (a distance of about half a mile) and found that there were five buildings in the early stages of demolition and excavation, eight buildings in the more advanced stages of construction, and three just completed, but not yet occupied, all of which were large-sized buildings intended to be occupied as department stores and other large retail business establishments.

On Piccadilly Mr. Hastings's big apartment-house on the site of Devonshire House is progressing very rapidly, the steel frame being almost entirely completed. Another large apartment-house is going up directly behind it, on Berkeley Street, and the site has been cleared for another large apartment-house in the next block to Devonshire House on Piccadilly.

Some of the other districts in which considerable activity may be noticed, are down in the City, where a large office-building is being erected on the site of the Old Post-Office in Cheapside, and a large office-building is being built by the Royal Mail Steam Packet Company in Leadenhall Street. On the Strand five buildings are nearing completion and out in Kensington a department store, an apartment-house, and a large kinema, as the English call a moving-picture house, are some of the buildings being erected.

The general character of the work which is being done is excellent and resembles American work not a little, as it is all steel construction, with concrete floor-slabs. The greatest difference between the buildings being built in London and those which are being built in the United States is that the average height of the buildings in London is only five and six stories. One noticeable feature of their building methods which is quite a surprise to an American, especially one from New York, is that they do not give their steelwork a shop coat of paint, only giving it a field coat and in some cases omitting the painting entirely.

In Regent Street the new buildings are in many cases being erected right over the first story of the old buildings, and business is carried on as usual. The general architectural style of the new buildings in Regent Street is not particularly good, being a rather mediocre type of department-store French Renaissance, similar to that which we have had an overdose of here in the United States in the past.

The two most interesting buildings which have been completed recently in London are the Midland Bank Building in Piccadilly, by Sir E. L. Lutyens, and Liberty & Company's new building in Argyll Place, off Regent Street. The bank building adjoins St. James Church, Piccadilly, designed by Wren and harmonizes with it most charmingly, and when the bank building is mellowed a little by time they will blend together perfectly. The details are worked out in a most interesting manner, and at first sight one would believe them to be the typical seventeenth-century motifs used by Wren and his contemporaries, but on closer examination one discovers that, although the general outlines of the keys in the arches and the consoles under the pediments are the same as the early work, they are worked in a purely original manner, which is Mr. Lutyens's own and not copied from any one.

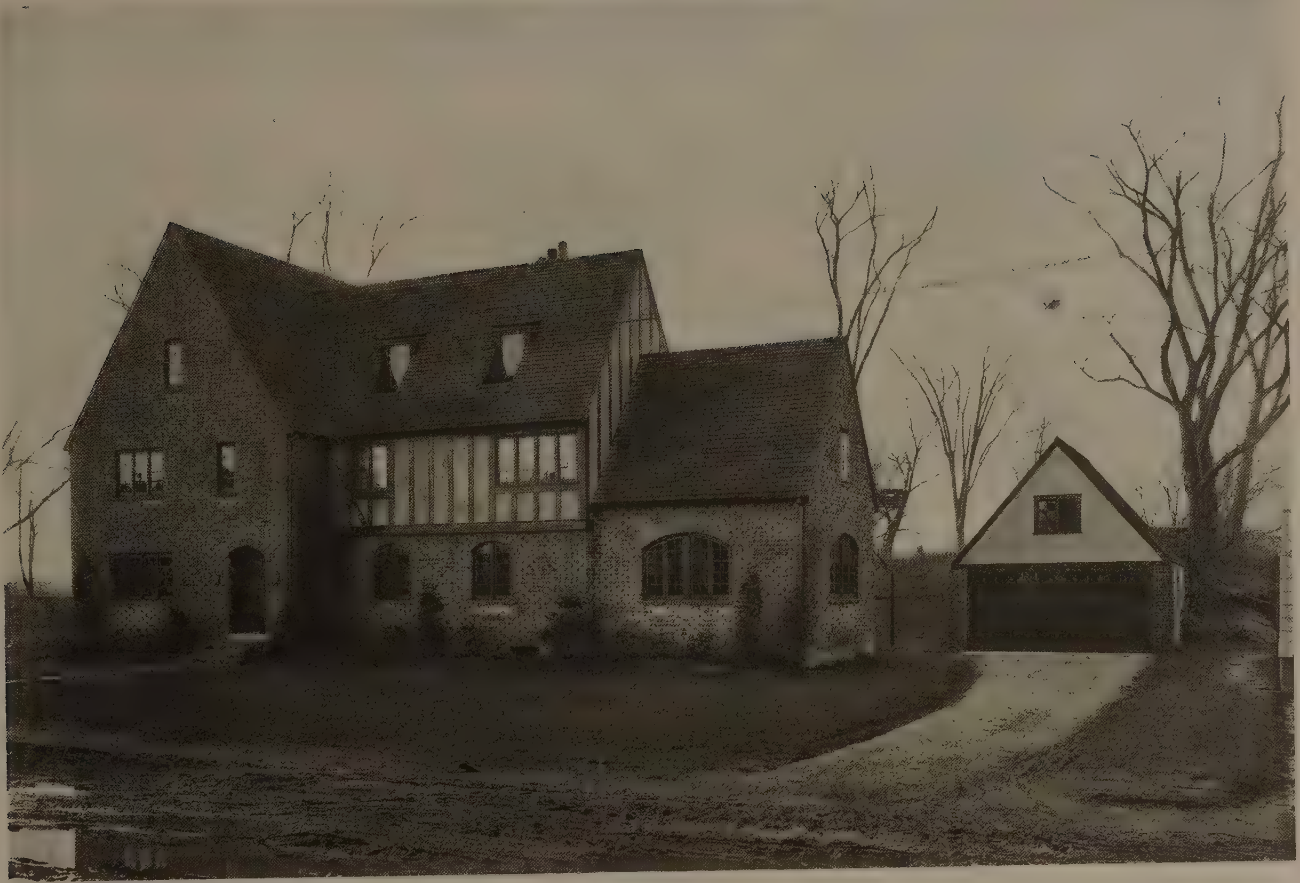
Liberty's building, which is quite well known in this country through their advertisements in the various magazines, is a most wonderful exhibition of craftsmanship, and viewed from the outside can perhaps be best described as a much-enlarged Tudor house, Chester-magnified, as it were, the timber-work both on the outside and the inside being of seasoned oak and teak taken from two old "three-decker" men of war, all mortised, trimmed, and pegged in the true old style. The carving is beautifully executed, and all of the details, lead-work, ironwork, glass, etc., are worked out in perfect harmony with the rest of the work.

A building like Liberty's could not have been erected in any of the larger cities in the United States, as the building codes would not permit such an extensive use of wood in the construction of a building to be used as a department store. Not only all of the exterior half-timber work, balconies, bay-windows, and large boards are of wood, but in the interior the columns around the open wells, the hammer-beam roofs, and the ceiling beams are all of timber. All of this goes toward making a very beautiful building, but one cannot but stop and think that with all of this exposed woodwork, and the building filled with highly combustible merchandise, what would be the result if a fire once got started there, especially during business hours?

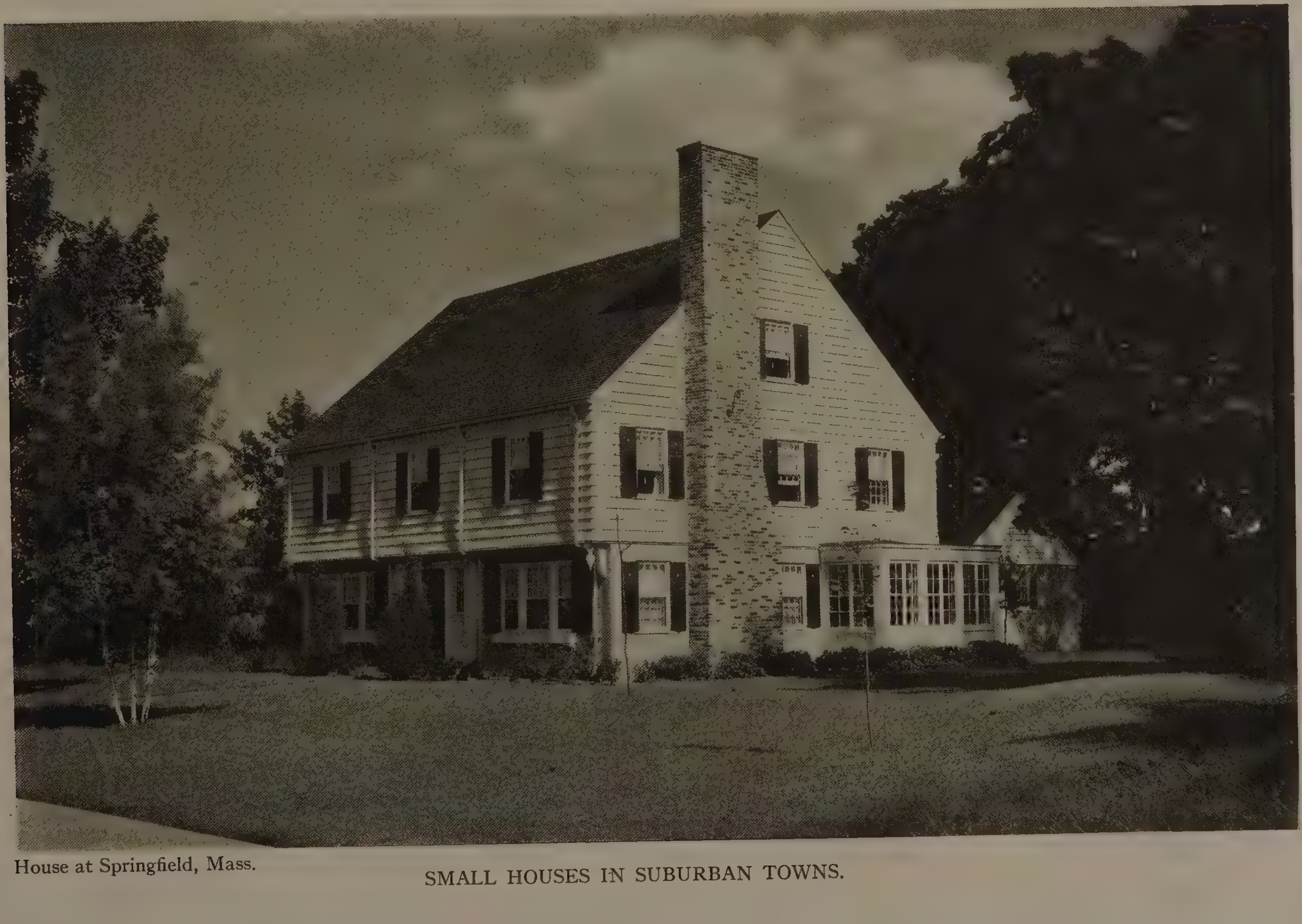
Conditions in Paris are unfortunately quite the reverse of what they are in London, as there is comparatively little building going on there, although there is more work in progress at the present time than there was in the summer of 1923. At that time I saw only one building under construction, the Magazins du Printemps, which was being rebuilt after having been practically destroyed by fire.

A number of new apartment-houses are being constructed at the present time in various sections of the city and one office-building is being built near the Bourse. Other work is being started, as an entire block of apartments is being demolished on the Boulevard des Italians and several old houses on the right bank of the Seine near the Pont Neuf are being torn down to make room for new buildings.

This small amount of building means very little for Paris, where the shortage of apartments is so great, for it is almost impossible to secure an apartment in the city at the present time, but with the franc at less than five cents, and no prospects of any increase, it is almost impossible to finance any great amount of building.

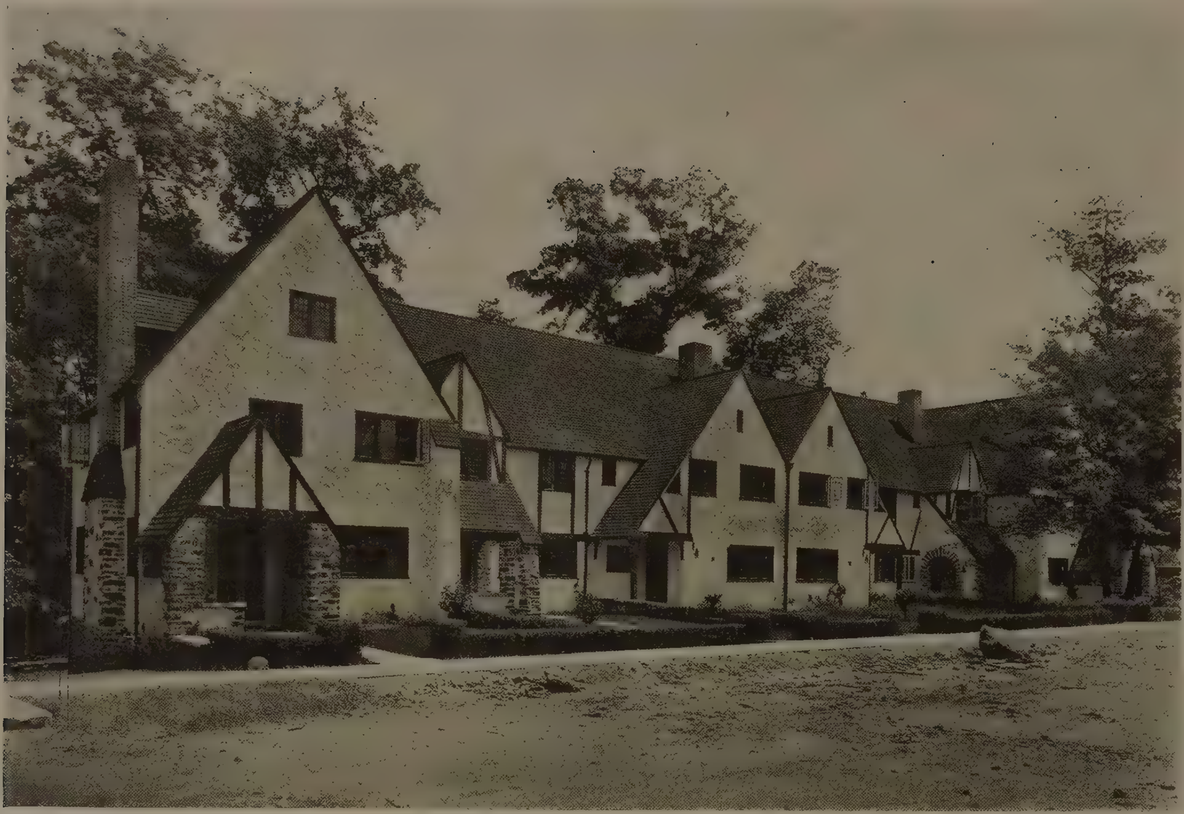


House at Larchmont, N. Y.

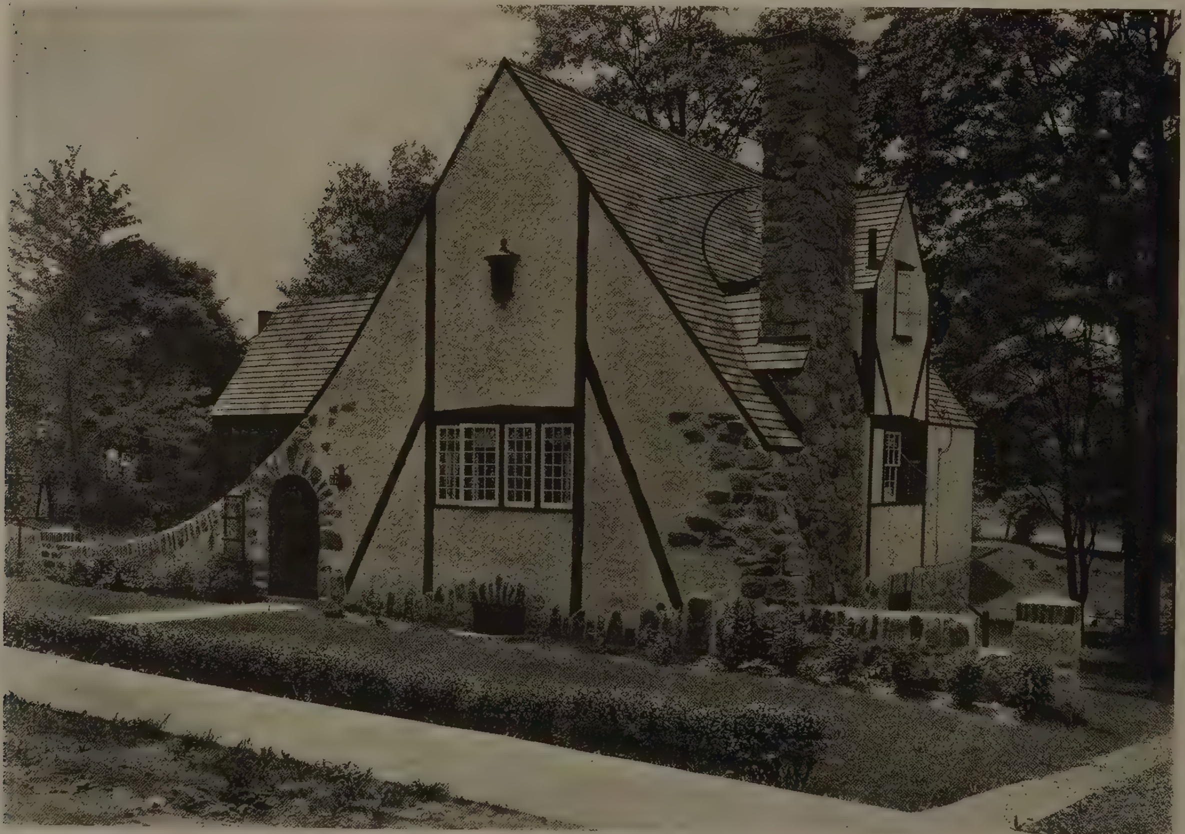


House at Springfield, Mass.

SMALL HOUSES IN SUBURBAN TOWNS.



Houses at Pelham.



House at Pelham.

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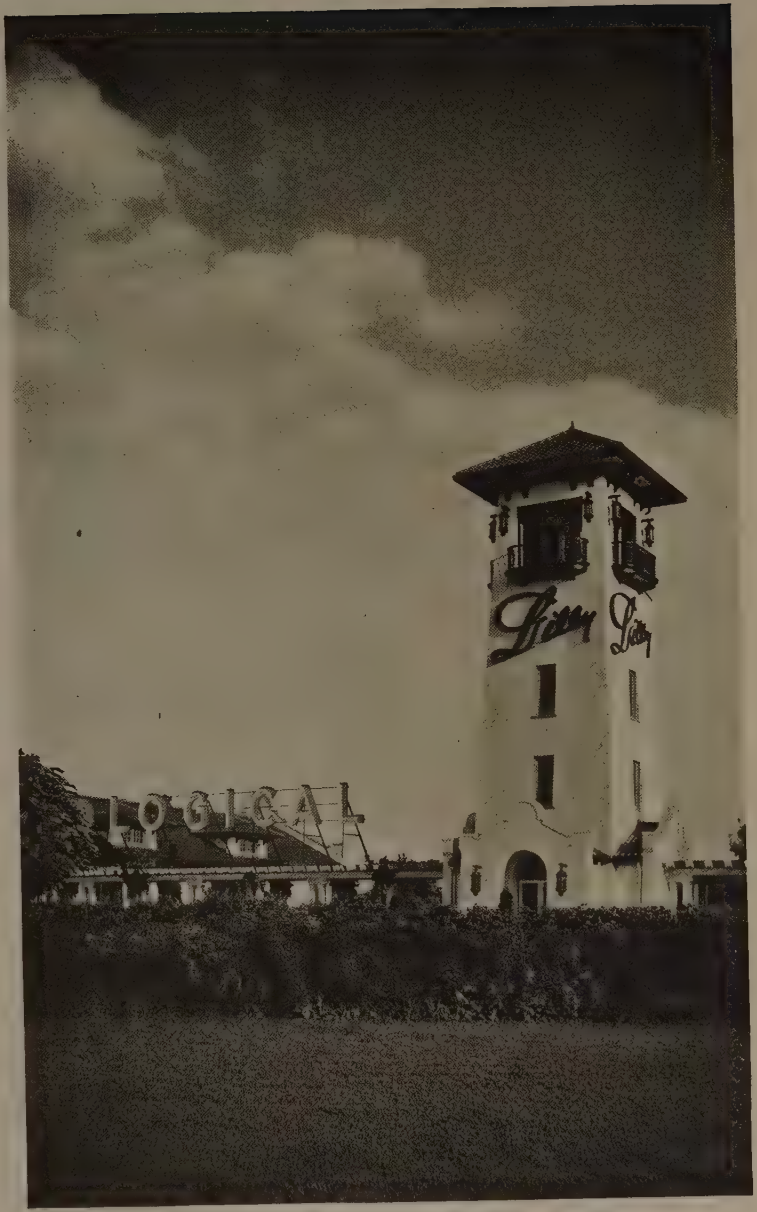

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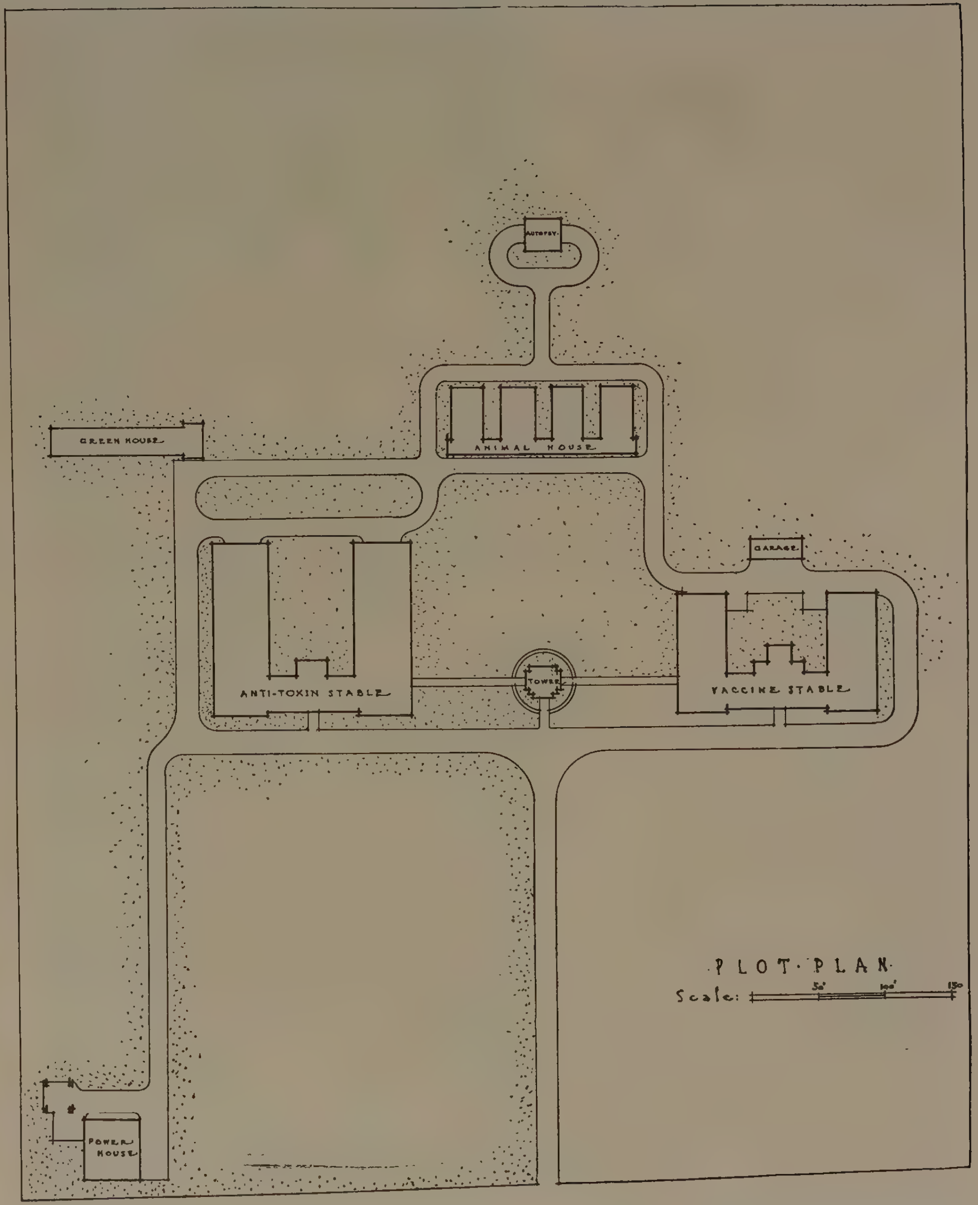
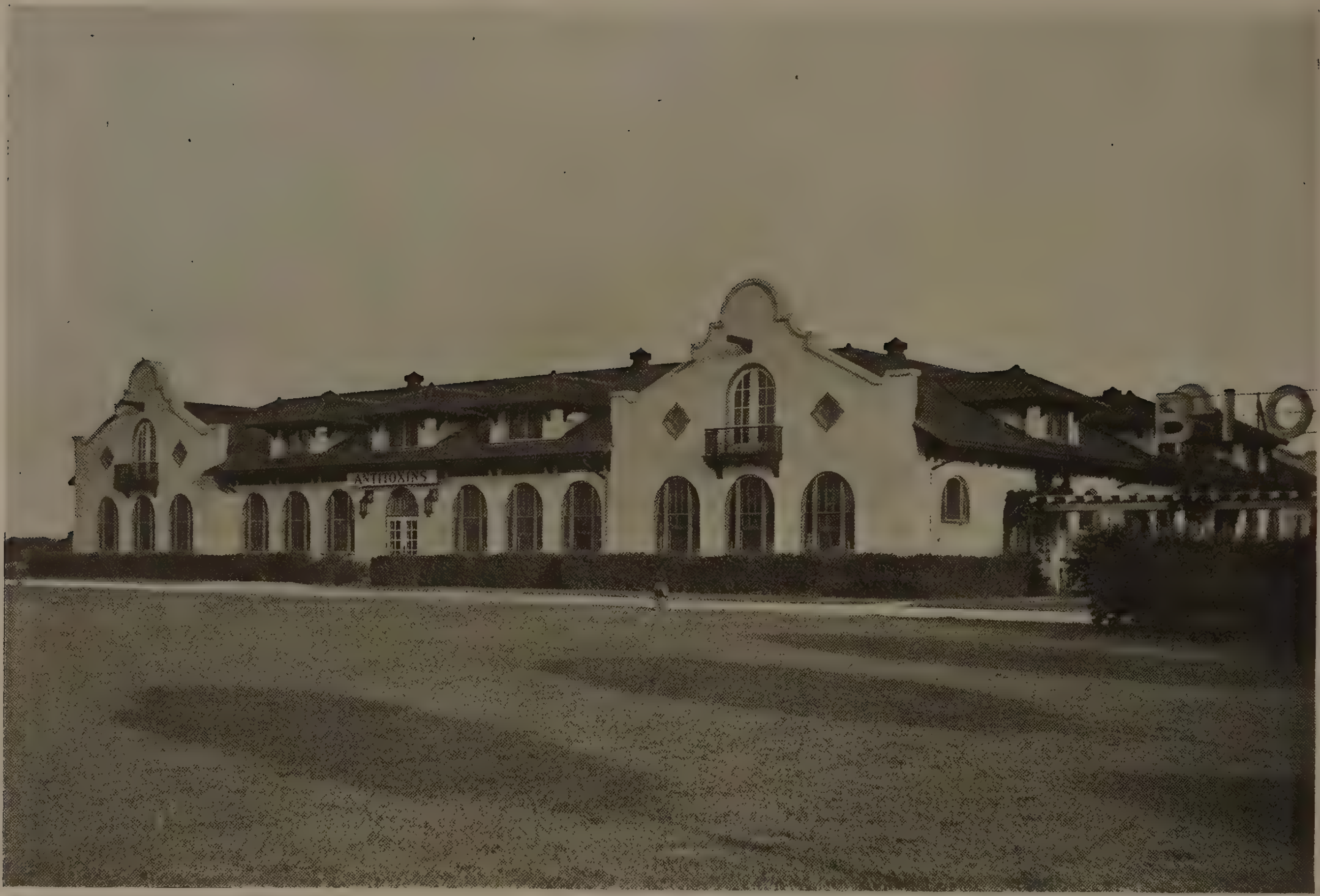
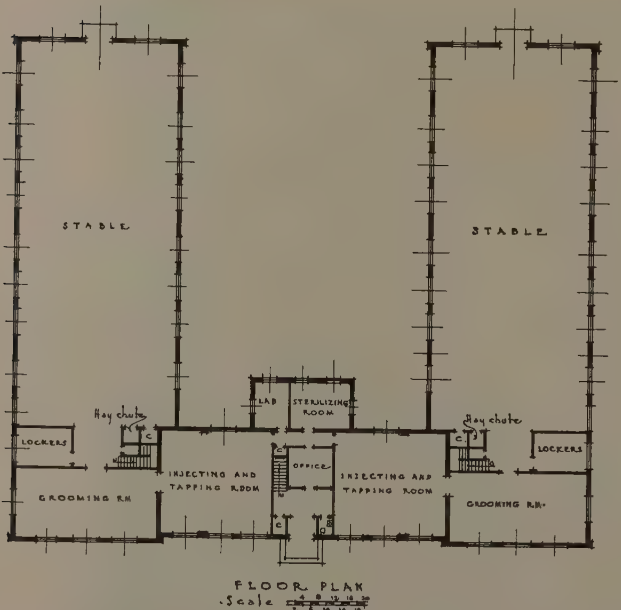
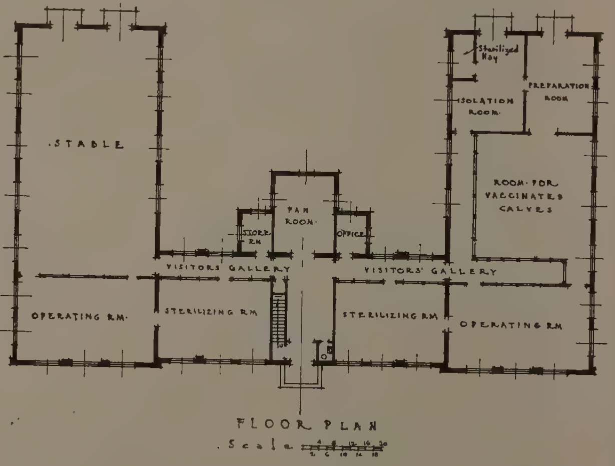


Robert Frost Daggett, Architect.





ANTI-TOXIN STABLE.



VACCINE STABLE

BIOLOGICAL PLANT, ELI LILLY CO., GREENFIELD, IND.

Robert Frost Daggett, Architect.

The Effect of Gravity on Building Construction

By H. Vandervoort Walsh

Professor of Construction, School of Architecture, Columbia University

Article III

THE FOUR METHODS OF CONSTRUCTION INVENTED BY MAN

IN all of the thousands of years that man has been building on the earth he has invented only four distinct systems of construction. Of the origin of these systems we know nothing.

We guess that prehistoric man built with wood before he built with stone blocks, and so invented the skeleton system of construction first. But there are no wooden buildings left to prove it.

We have, however, a remarkable record of the high development of the carpenter's trade in the year 2000 B. C. in Egypt. It is a model of a carpenter-shop taken from the tomb of Mehenkwetre, chancellor and steward of the royal palace during the reign of Pharaoh Mentuhotep, about 2000 B. C. This model shows the interior of the shop with its equipment and craftsmen at work. Along two sides are carpenters with adzes squaring up heavy timbers. On another side are more who are rubbing down and smoothing the surface of the wood. In the middle is a post to which is lashed with rope a thick plank in an upright position. A black fellow—indeed all of the workers seem to be black—is sawing this plank from top to bottom into thin boards. Another worker near him is cutting mortises and tenons with a chisel which he strikes with a wooden mallet. This is such an extraordinary picture of the advanced condition of the carpenter's trade that we cannot be otherwise than convinced that many thousands of years had passed before the time when this model was built, for the trade to have reached this stage of development.

To find the traces of the earliest efforts of man to build with blocks is likewise impossible. We marvel at the primitive stone monuments left by a community of Neolithic men who lived in Coldrum in Kent, and have reckoned the date of their construction to be about four thousand years ago, but this is very modern for the Neolithic man, since, in other parts, his traces show evidence of his activities perhaps thirty thousand years ago. And even then man was by no means young.

But to make us realize how far back into the past must be the day when man learned to build with blocks, we have only to look at the great skill shown by the Egyptians of three thousand years ago in handling blocks of stone. We have one special record of the time when the chief architect and namesake of Pharaoh Amenhotep III had carved from the quarries in the red mountains and the sandstone hills of Adfu the 70-feet-high Colossi of Memnon. The writings show that eight special boats were built to bring them down the river to Thebes. Amenhotep enthusiastically commented at the time that they were wonderful for size and height, and that they would last as long as heaven. Such pictures make us stop and consider the question of how long before this time had man been learning the art, so wonderfully developed, at a date that seems to us remote beyond understanding.

Simple block construction, Temple of Luxor, Thebes.

A slightly advanced system of block building was devised by man when he discovered how to balance his blocks in an arch. There are some theories that this knowledge was hit upon by accident by the Babylonians, who were forced to use small building units such as bricks because of lack of stones big enough to span openings. However, this is only a theory. But we can follow the progress of this idea down through the ages and notice that it reached its full fruition in the cathedrals of the Middle Ages. This system of construction is really clever block building, involving the skill and knowledge of the mason concerning the best ways to balance them.

Another method of building which was carried to a very high state of development by the Romans is the cohesive system. This is but the art of the potter carried out on a large scale. It is concrete construction. The building is moulded as one cohesive mass. Domes are like inverted china bowls, vaults and arches like natural caves cut out of the rocks by the waters. Like the other systems of construction, no one knows where or how man discovered its principles.

Thus we have inherited from our ancestors four ways to build which we will sum up as follows:

1. Skeleton construction.
   A frame or skeleton of the building is constructed like a cage and is covered on the outside with material to protect from the weather. A tough and elastic material like wood or metal is needed to build this frame.
2. Simple block construction.
   Walls, piers, or columns are layed upon a foundation. Holes in the walls and the spaces between the columns are covered with horizontal stones called lintels. This system requires very closely spaced supports, since stone blocks make poor beams.
3. Balanced block construction.
   Walls and piers are erected to hold vaults or balanced stones which roof over the open spaces

within the building. Arches are used over the openings in the walls.

4. Cohesive construction.

Walls, vaults, domes, and the like are formed with concrete poured into moulds. The building becomes one solid unit.

Balanced block construction, Amiens Cathedral, France.

These systems of construction are usually mixed up in the same building, and we do not find many examples that are distinctly of one type.

Of the skeleton construction of wood we have only suggestions of ancient methods here and there. Models, as we have previously mentioned, have been taken from Egyptian tombs that are suggestive of what was done. There are ruins of old stone monuments in many parts of the world which seem to be copies of wooden buildings. But after all they do not serve as clear examples. We do know, however, the traditions of the English half-timber farmhouse and, as our own frame buildings of wood are direct descendants, we can study them as types of this construction.

We can find many good examples of simple block construction, though, that are very old. There is one in particular which shows this method of building in its purest form. We refer to the tomb of Osiris at Abydos, excavated in 1912 and 1914 by Professor Naville. The interior columns are nothing more than square blocks set up on end, and the roof is built with blocks laid on top of them. Nearly every child that plays with blocks builds such a structure in miniature.

Cohesive construction, Baths of Caracalla, Rome.

When we look for examples of balanced block construction we naturally think of the great cathedrals of the Middle Ages that were erected in France, Germany, and England, but some of the earliest Roman bridges show us very wonderful applications of this principle of construction. There is one in particular, built about one thousand eight hundred years ago across the Tagus in the Spanish province of Cáceres. This bridge has six arches, the two central ones having spans of 100 feet and being raised above the river 180 feet. All of the blocks of the arches are laid without mortar. This bridge can truly be said to stand because of the skilful balancing of great blocks of stone in the arches, for no mortar binds the units together.

As for examples of cohesive construction, there are the ruins of the baths of Caracalla at Rome, Hadrian's Villa at Tivoli, and other Roman buildings of similar construction that have been stripped of their outer shell of decoration, leaving the massive concrete walls and vaults to tell the tale of how they were fashioned from concrete and small bricks.

Yet, although these four systems of construction are very old, and they have been employed in the erection of great buildings, no one knew how they stood up. Because of this ignorance, each building was an experiment in construction. There was no assurance that it would not fall down until it actually showed by standing that it would not.

In these days, when we can erect buildings 700 and 800 feet high and build over spans 250 feet wide without the least doubt concerning the stability of the structure, it is hard for us to appreciate the point of view of the old builders who hoped and prayed that their structures would not collapse. Even the Romans with their very practical minds were superstitious about the ability of their work to stand. When the keystone of their arches was dropped into place and the forms removed, they were always fearful of the results. The good-will of the gods was asked to keep the arch from thrusting out its support. We recall one story that illustrates this. In building the central arch of the Bridge of Alexander over a tributary of the Tigris at Zakhu, a village in Irak about 80 miles south of Lake Van, repeated attempts to make it hold were failures, until a virgin was buried alive above the keystone as a sacrifice to the gods.

Such stories reveal a point of view which is hard for us to understand, because we do know to-day that no supernatural powers are at work to pull down our building, but that there is a force, constant and regular, that drags all of the members of the structure downward. This force bends beams, creates the thrusts in arches, and causes the foundations of the building to skink. But our ability to even think of this force in so abstract a manner is due to a few men such as Copernicus, Da Vinci, Stevinus, Galileo, Huygens, and Newton.

Because of our knowledge of the whys and hows of

Skeleton construction, English half timber.

this force on a structure, we have advanced the frame structure of wood to the great frame buildings of steel, and the cohesive system from the clumsy and heavy structures of the Romans to the strong and light buildings of reinforced concrete and the wonderful flat tile domes invented by Gaustavino. We have discarded the simple block system and the balanced block construction and use it only in combination with the frame and cohesive, because such systems of building are clumsy and wasteful of materials. We are able to determine the necessary size for our structural parts without guessing, knowing that our building will not sink into the ground, topple over in the wind or cave in with its own load.

This is a tremendous change in construction, and to thoroughly understand the matter means the absorption of certain ideas that took many years to develop. For this reason we will begin our observations in the order in which these ideas came into light.

Steel Will Be Largely Used in Rebuilding Santa Barbara, According to Mayor Andrea

STEEL is to play a leading part in the rebuilding of Santa Barbara, where reconstruction activities have passed the financing and other preliminary stages, and are now well on the way toward tangible evidence of the determination of the people of Santa Barbara to erect a still more beautiful city on the ruins of the old.

After making a personal survey of the buildings wrecked by the quake, and after familiarizing himself with the reports of various groups of engineers, C. M. Andrea, mayor of Santa Barbara, has declared himself in favor of a municipal building ordinance requiring structural steel frames for all Class A buildings to be erected in the city in the future.

"Had the wrecked buildings of Santa Barbara been of steel frame construction, they would still be standing," said the mayor. "As an example of what steel frames will withstand, look at the Post Office. It is in the centre of the damaged zone; yet, due to steel, it stands virtually without injury. If I were drafting a new building ordinance, I would compel the use of steel frames for all buildings of the Class A type."

Those engaged in rebuilding Santa Barbara are not waiting, however, for the passing of an ordinance requiring the use of steel frames. In outlining his plans for a new hotel in Santa Barbara, Ole Hanson, former mayor of Seattle, and now a prominent realtor, stated that the building would be of structural steel construction since he was convinced that steel, because it possesses an elasticity lacking in other building materials, is best fitted to withstand future convulsions of the earth.

It is this factor of elasticity which makes steel construction the best for buildings in earthquake zones, according to J. D. Galloway, chairman of the National Committee on Earthquakes of the American Society of Civil Engineers.

"Elasticity is the keynote of sound construction in those districts which are subject to earthquakes," Mr. Galloway stated. "Even in the most severe quakes conceivable —quakes in which the structural steel might be called upon to bear stresses beyond the 60,000-pound limit of ultimate compression and ultimate shear—the columns would not fail, for the elasticity and cohesion of the steel would keep them intact, although they might become twisted and bent."

The present building ordinance of San Francisco requires steel frames for all structures of over eight stories. In his report to the American Society of Civil Engineers, based upon a thorough investigation of the effects of the earthquake upon various types of buildings in Santa Barbara, Mr. Galloway will recommend that this limit be greatly reduced.

Book Reviews.

ENGLISH GARDENS. By H. AVRAY TIPPING. Profusely and Beautifully Illustrated from Photographs of Actual Gardens, and Including Some Reproductions of Old Drawings. Charles Scribner's Sons, New York.

We have been recently re-reading, with renewed pleasure and profit, the new edition of Mrs. Van Rensselaer's "Art Out-of-Doors." Of all the garden books dealing with American landscape, none has more charm of manner, or contains more helpful and well-considered suggestions. Mrs. Van Rensselaer has something to say about the traditional English garden, and refers to a number of the old writers who often combined their philosophy with a delightful appreciation of garden craft.

One might almost say that all England is a garden-land. To one who has travelled the roads in May-time, glimpsed, in passing, beyond the high walls that so often shut out the mere traveller, something of the intimacy and loveliness of the English home grounds, such a book as this will have something more than a mere professional appeal. It smacks of the long years of careful and thoughtful cultivation, of ordered and traditional planting, for beauty and for sentiment. Mr. Tipping has given us the widest possible variety of subject, from the simple cottage garden to that of the large estate, where wealth has, for many years, developed and maintained gardens of national reputation.

Some of us find a certain insistent formality, a lack of spontaneity and naturalness in many English gardens. And where but in England would you see the trees trimmed to look like peacocks of foliage, or dogs in full cry? Quaint, we might call these things, and let it go at that, but such things make us feel much as we do when we see a fine dog's ears trimmed in the name of style. A bad business for trees or dogs.

In looking over the illustrations of this book we are continually getting charming vistas and bits of garden loveliness. The Pergola Garden in Rose Time; Iris, Lupin, and Pansy; A Glade Leading to the Lawn and West Side of the House; The Outer Garden and its Jacobean Building; The Multitude Yews; Looking Across the Rose-Walk, etc., etc. Enticing titles to enticing views.

While it is a book about gardens, incidentally it is a book about architecture, for in many of the views the house, old or new as it may be, is shown.

Mr. Tipping gives us the English point of view in the following words, and we can agree with him pretty generally:

"The subject is the more worthy of attention from our being able to claim that the English of to-day hold the first place in the world as the producers and maintainers of the 'Garden of Pleasure.' We complain of our climate. Yet, from its comparative equability of temperature, with frequent changes within a limited range, and from its local varieties of site, soil, and climate, it is, almost beyond any other, adapted for varied gardening, for the forming of grounds of every type, and for the cultivation of species in the greatest number. Full advantage is taken of these favourable conditions. We like our gardens, we devote our attention to them, we intelligently choose the forms and the plants that Nature demands for a special site, or we cajole her into taking under her wing our special favourites. And all this we do in a way and to an extent not so fully reached by any other community. The French may be more apt in propagation and in culture, especially of fruit and vegetables; the Dutch hold the record for bulb production; the Germans continue to be the most careful seed growers; the Americans can spend more in great layouts and ambitious schemes; the Italians have a more splendid past; but for the efficient development and combination of the manifold pleasure aspects which horticulture now presents, our country offers the best field, while our taste and our learning make us keen and successful tillers therein."

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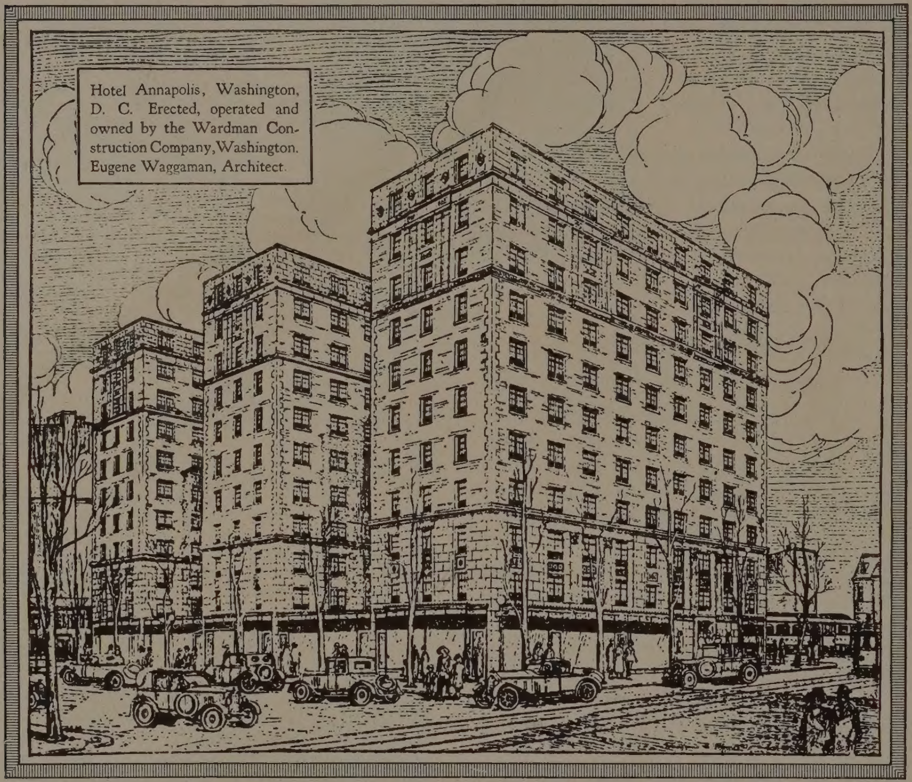

Hotel Annapolis, Washington, D. C. Erected, operated and owned by the Wardman Construction Company, Washington. Eugene Waggaman, Architect.

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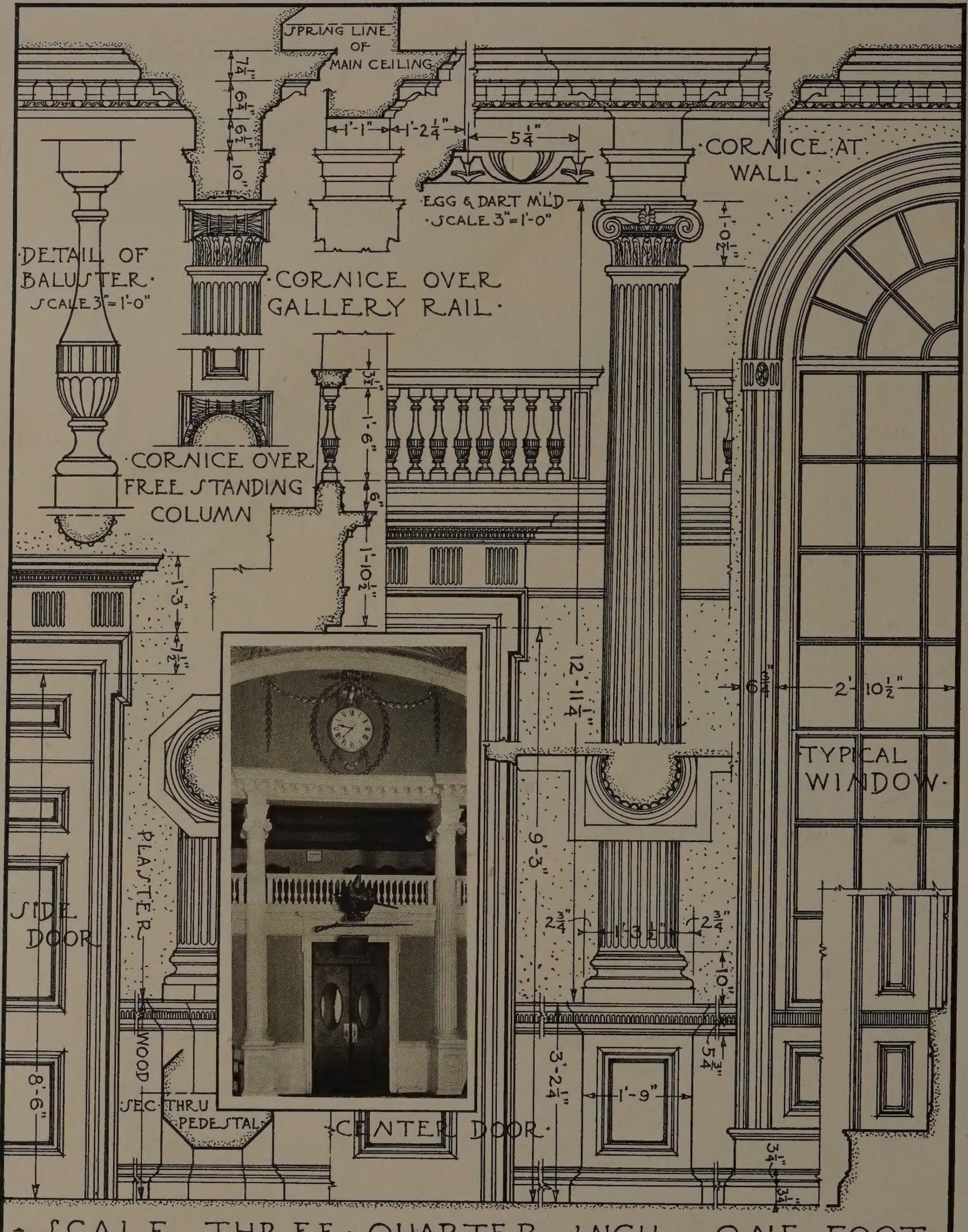

-SCALE THREE-QUARTER INCH ≈ ONE FOOT-

-DETAILS OF ORIGINAL SENATE CHAMBER-

-MASSACHUSETTS STATE CAPITOL BUILDING- -BOSTON-
-COMPLETED 1798- -CHARLES BULFINCH-ARCHITECT-
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